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Monitoring impacts from Council Regulation (EU) No 333/2011: End-of-waste criteria for Al/Fe scrap



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Abstract

On 9 October 2011, Council Regulation 333/2011 came into force establishing criteria by which scrap from iron and steel, aluminium and aluminium alloys could cease to be regulated as waste. This study examines the impacts of the Regulation on scrap availability, trade flows, prices, administrative requirements and environment or human health incidents. Based on the feedback from industry and authorities surveys, it was shown that more than 1,100 scrap industry companies are already using the end-of-waste criteria across Europe. Uptake is most pronounced in Italy, where over 1,000 scrap companies generate end-of-waste compliant scrap, due in part to a specific legal framework on secondary raw materials that was already in place in Italy before the introduction of the EU end-of-waste criteria. In terms of the quantity of end-of-waste compliant scrap available on the market, this study estimates that, as a lower bound, at least 15% of EU scrap steel and 10% of EU scrap aluminium is compliant. Importantly, this study has found almost no evidence that end-of-waste has caused any negative impacts on the market, whether that be to scrap quality, availability/trade or on the environment. On the contrary, quite a number of the survey participants, both from industry and Competent Authorities highlighted the perceived benefits of the introduction of end-of-waste for metal scrap. These perceived benefits include: creating a simplified regulatory framework and offering companies greater flexibility and legal certainty. Some companies identified improved scrap quality and increased sales prices. Future monitoring efforts could be based on a similar industry and authorities surveys as used in this study, to be carried out ideally within 2-3 years.

European Commission
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Monitoring impacts from Council Regulation (EU) No 333/2011: End-of-waste criteria for Al/Fe scrap

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Disclaimer

The present document has been elaborated with the greatest care and has been reviewed by Commission staff and stakeholders prior to publication. Nonetheless, the authors are not responsible for any incorrect information provided.

This study does not constitute any commitment by the European Commission with regard to possible future end-of-waste initiatives.

Glossary

ASSIRAL	Associazione Italiana Raffinatori Alluminio (Italian Aluminium Refiners Association)
ASSOFERMET	Italian Association of Steel and Iron, Non-ferrous Metals, Ferrous Scraps, Tools
BIR	Bureau of International Recycling,
BMRA	British Metals Recycling Association
BOF	basic oxygen furnace
CB	Certification Body
CRU	Commodities Research Unit
DG	Directorate-General
EAA	European Aluminium Association
EAF	electric arc furnace
EC	European Commission
EEA	European Economic Area
EFR	European Ferrous Recovery & Recycling Federation
ELV	end-of-life vehicles
EoW	end-of-waste
EU	European Union
Eurofer	European Steel Association
EUROMETREC	European Metal Trade and Recycling Federation
FEAD	European Federation of Waste Management and Environmental Services
FEDERACCIAI	Federazione Imprese Siderurgiche Italiane
FEDEREC	Fédération des entreprises du recyclage (France Scrap Industry Association)
FER	Federación Española De La Recuperación Y El Reciclaje (Spain Scrap Industry Association)
FFA	Fédération Française de l'Acier (French Steel Association)
IMPEL	European Union Network for Implementation and Enforcement of Environmental Law
IPPC	Integrated Pollution Prevention and Control
IPTS	Institute for Prospective Technological Studies
ISO	International Organization for Standardization
JRC	Joint Research Centre
LME	London Metal Exchange
MS	Member State
NQA	National Quality Assurance
OEA	Organisation of the European Aluminium Recycling Industry
OECD	Organisation for Economic Co-operation and Development
PVC	polyvinyl chloride
QMS	quality management system
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
SoC	Statement of Conformity
SPSS	Statistical Package for the Social Sciences (software)
UBC	used beverage cans
UK	United Kingdom
UNESID	Unión de Empresas Siderúrgicas (Spanish Steel Association)
UAE	United Arab Emirates
UKAS	United Kingdom Accreditation Service
USA	United States of America

Units Conventional SI units and prefixes used throughout: {k, kilo, 1,000} {M, mega, 1,000,000} {G, giga, 10⁹} {kg, kilogramme, unit mass} {t, metric tonne, 1,000 kg}

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Note: the above list represents only a proportion of the full list of organisations who participated in the industry survey, as some of the organisations chose to respond anonymously.

Abstract

On 9 October 2011, Council Regulation 333/2011 came into force establishing criteria by which scrap from iron and steel, aluminium and aluminium alloys could cease to be regulated as waste.

This study examines the impacts of the Regulation on scrap availability, trade flows, prices, administrative requirements and environment or human health incidents. Because no data currently distinguishes between waste and end-of-waste compliant scrap, information was collected from the EU Competent Authorities and industry using detailed surveys. Across Europe, approximately 250 companies provided responses to the industry survey (representing approximately one quarter of the membership of the scrap industry associations), with a further 15 submissions from industry associations and 25 from Competent Authorities, although the survey responses were notably skewed towards Italy.

The results of the study show that more than 1,100 scrap industry companies are already using the end-of-waste criteria across Europe. Uptake is most pronounced in Italy, where over 1,000 scrap companies generate end-of-waste compliant scrap. This rapid uptake in Italy is due in part to a specific legal framework on secondary raw materials already in place before the introduction of the end-of-waste criteria. In the rest of Europe there are a further 100 scrap companies active in end-of-waste scrap. In terms of the quantity of end-of-waste compliant scrap available on the market, this study estimates that, as a lower bound, at least 15% of EU scrap steel and 10% of EU scrap aluminium is compliant.

Importantly, this study has found almost no evidence that end-of-waste has caused any negative impacts on the market, whether that be to scrap quality, availability/trade or on the environment. On the contrary, quite a number of the survey participants, both from industry and Competent Authorities highlighted the perceived benefits of the introduction of end-of-waste for metal scrap. These perceived benefits include: creating a simplified regulatory framework and offering companies greater flexibility and legal certainty. Some companies identified improved scrap quality and increased sales prices.

At the expert workshop participants debated several ideas for a future monitoring system. One key conclusion was that there is no urgent need to revisit monitoring in the near future, due to the relatively modest rate of uptake outside Italy and the very few, if any, negative impacts observed so far. A repeat of the industry and authorities' surveys in 2-3 years time was deemed to be the most appropriate way to monitor end-of-waste for scrap metal, and copper scrap could be added to the scope of that exercise.

Executive summary

On 9 October 2011, Council Regulation 333/2011 came into force establishing criteria by which scrap from iron and steel, aluminium and aluminium alloys could cease to be regulated as waste. These included the recovery operations and quality procedures required to meet the criteria.

The purpose of end-of-waste criteria is to:

- promote high quality recycling of secondary raw materials, reduce the consumption of natural resources and reduce the amount of waste sent for disposal
- ensure a high level of protection to the environment and human health
- provide legal certainty for investment decisions and the treatment of waste
- reduce administrative burdens from compliance with waste regulations
- improve the functioning of the internal market by harmonising procedures at a European level.

During the development of the Regulation, it was noted that the end-of-waste criteria could possibly influence scrap metal markets. A specific concern was that the Regulation might increase scrap exports from the EU and create a deficit of metal scrap in Europe. The Regulation therefore included a provision for monitoring the market conditions for scrap metals, to check whether any adverse effects have occurred in response to the introduction of the end-of-waste criteria for scrap metals.

In this context, the European Commission launched a monitoring exercise in 2013, and contracted Oakdene Hollins to collect and analyse data from the EU Competent Authorities and from industry to examine the impacts of the Regulation on scrap availability, trade flows, prices, administrative requirements and environment or human health incidents. A considerable amount of data was already publicly available; however, none distinguished between waste and end-of-waste compliant scrap.

To collect this data, detailed surveys were launched to enable direct data collection with key stakeholders from industry and Competent Authorities, and their respective associations (EFR, EUROMETREC, Eurofer, EAA, and IMPEL). Across Europe, approximately 250 companies provided responses to the industry survey (representing approximately one quarter of the membership of the scrap industry associations), with a further 15 submissions from industry associations and 25 from Competent Authorities.

Uptake of end-of-waste

Number of companies

The results of the study show that more than 1,100 scrap industry companies are already using the end-of-waste criteria across Europe.

This uptake is most pronounced in Italy, where over 1,000 scrap companies generate end-of-waste compliant scrap. This rapid uptake in Italy is due in part to a specific legal framework on secondary raw materials already in place before the introduction of the end-of-waste criteria. In the rest of Europe there are a further 100 scrap companies active in end-of-waste scrap markets, as of the 5th June 2014 (Figure 1)

There is no technical barrier to all steel and aluminium furnaces accepting end-of-waste compliant scrap, although most of the compliant scrap is consumed within Italy.

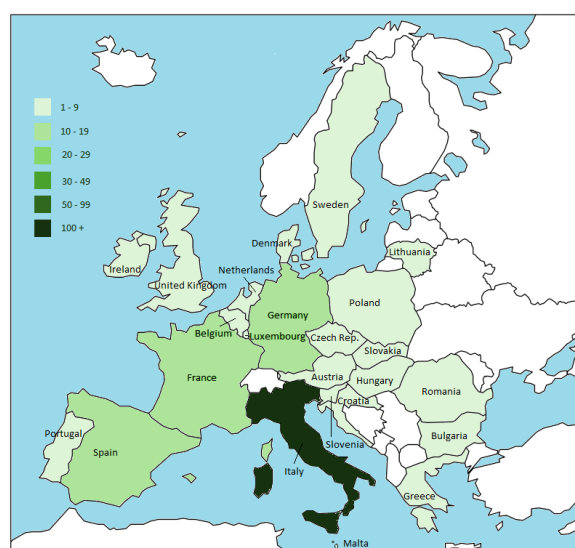


Figure 1: Geographical coverage of companies generating end-of-waste scrap (153 respondents)

The uptake of the end-of-waste criteria over time is shown for 135 of companies who participated in the industry survey (Figure 2). In the period September to October 2011 alone, 86 companies became end-of-waste compliant, but it is noticeable that all of these companies were operating in the Italian market. In fact, the second non-Italian scrap organisation to achieve compliance did so as late as November 2012. More than 75 % of the companies said they already had their Quality Management System certified by a third party body before they became compliant, with around a third specifically being ISO 9001 certified.

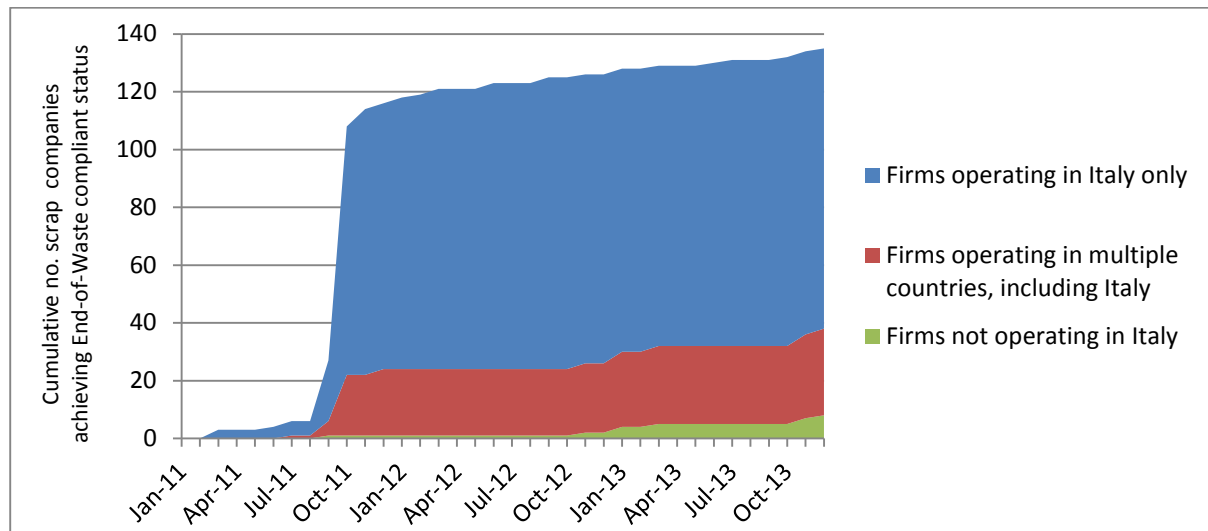


Figure 2: Uptake of end-of-waste criteria by month and region of operation (135 survey respondents)

Quantity of compliant scrap

In terms of the quantity of end-of-waste compliant scrap available on the market, this study estimates that, as a lower bound, at least 15% of EU scrap steel and 10% of EU scrap aluminium is compliant. Some differences in end-of-waste compliance are apparent between the different grades of scrap. Perhaps unsurprisingly, for both scrap iron/steel and aluminium, the grades with the highest proportion of end-of-waste compliance are either the cleanest grades or those with the largest overall tonnages – these include shredded scrap, new production scrap and stainless scrap (for steel), aluminium cuttings, old rolled aluminium, clean extrusion scrap and lithographic sheet (for aluminium) – see Figure 3.

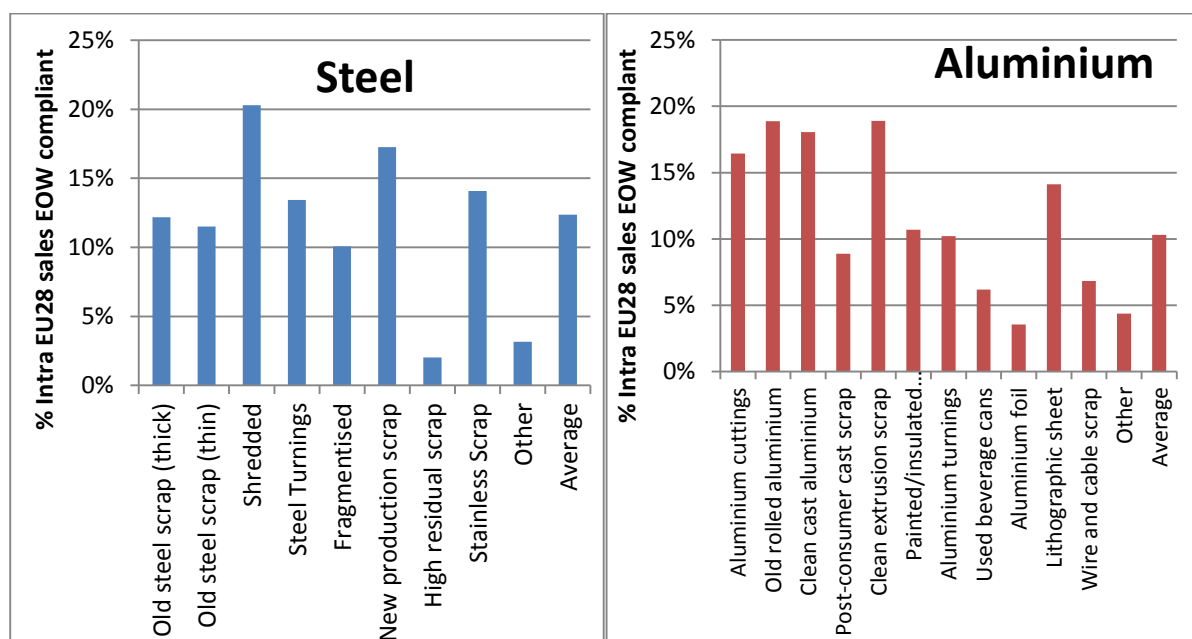


Figure 3: Estimated sales of end-of-waste compliant iron/steel and aluminium scrap by grade, 2012 (%)

Impact of end-of-waste

Importantly, this study has found almost no evidence that end-of-waste has caused any negative impacts on the market, whether that be to scrap quality, availability/trade or on the environment. On the contrary, quite a number of the survey participants, both from industry and Competent Authorities highlighted the perceived benefits of the introduction of end-of-waste for metal scrap. These perceived benefits include: creating a simplified regulatory framework and offering companies greater flexibility and legal certainty. Some companies identified improved scrap quality and increased sales prices.

The main factors motivating the scrap industry to pursue compliance include improving company image, gaining competitive edge and customer demand; and nearly half of the certified companies report receiving significant benefits so far (Figure 4). This is not to say all companies have identified benefits from achieving end-of-waste. Indeed, in Italy, the implementation of end-of-waste is so widespread that companies need to keep up with the competition to satisfy customers' requirements. Some others felt that the cost of achieving end-of-waste compliance outweighed their expected benefits.

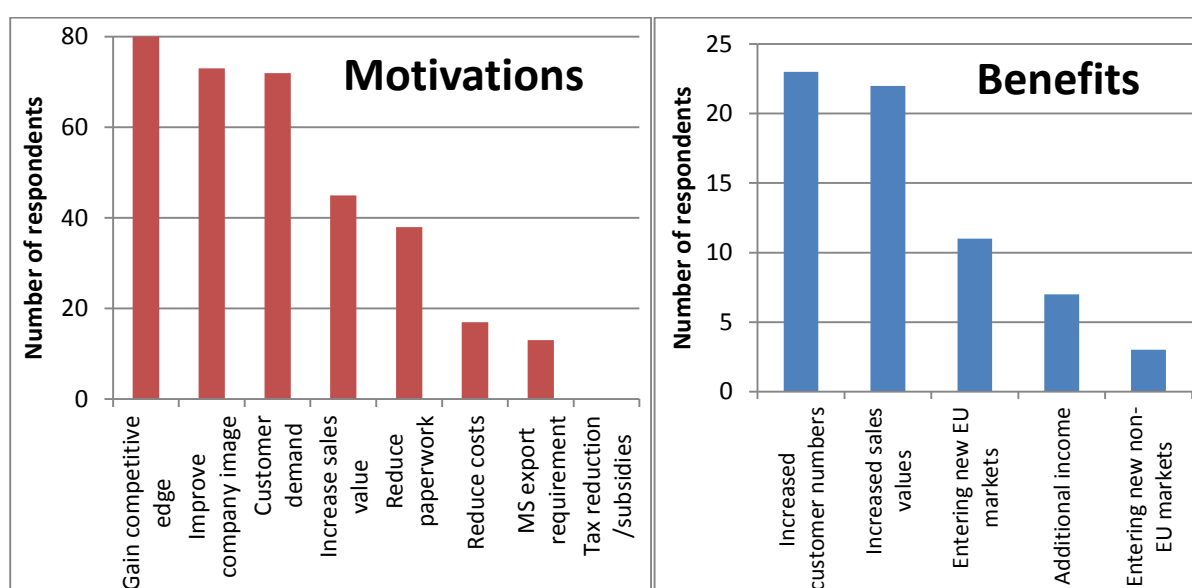


Figure 4: Motivation and benefits for pursuing compliance – scrap industry (145 respondents)

For the steel and aluminium industries, many survey participants said they were using end-of-waste compliant scrap and had observed that it was better quality, and reduces paperwork and operating cost (Figure 5). Both industries expressed an interest in increasing their purchases of end-of-waste compliant scrap. However, some participants responded that there is not yet enough supply of compliant scrap, or that it is more expensive than standard waste of sufficient quality.

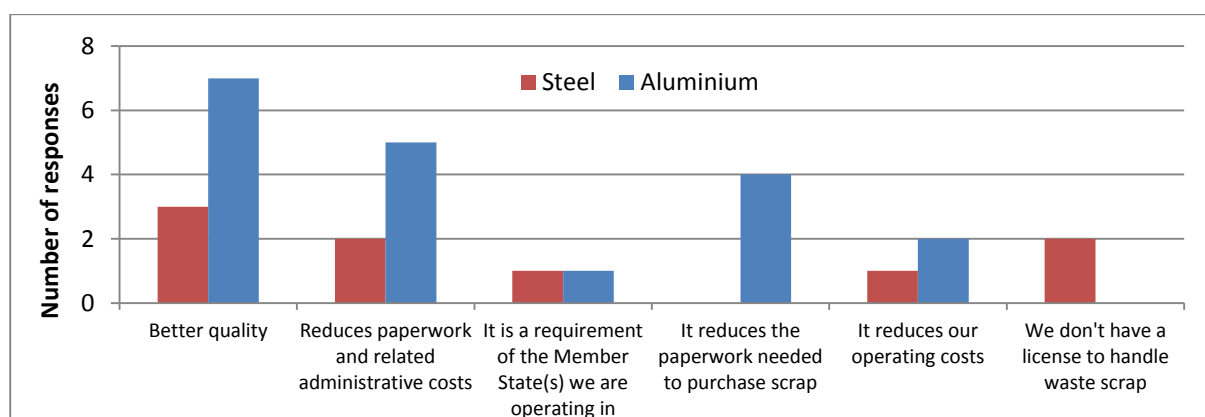


Figure 5: Reasons for using end-of-waste scrap (steel, 3 respondents; aluminium, 11 respondents)

Finally, survey participants were asked for their opinion of the market impacts that had resulted following the introduction of end-of-waste for scrap metal (Figure 6):

- On quality, more than 40 % felt that the quality of scrap on the market had improved, for all scrap, and for end-of-waste compliant in particular. The reasons given for this were the strict rules on maximum contamination and the wider introduction of quality management systems.
- On availability, the perception overall was that the introduction of end-of-waste criteria had not greatly impacted on the market availability of scrap, although this was a view more widely held in the scrap generating industries than by the scrap consuming industries.

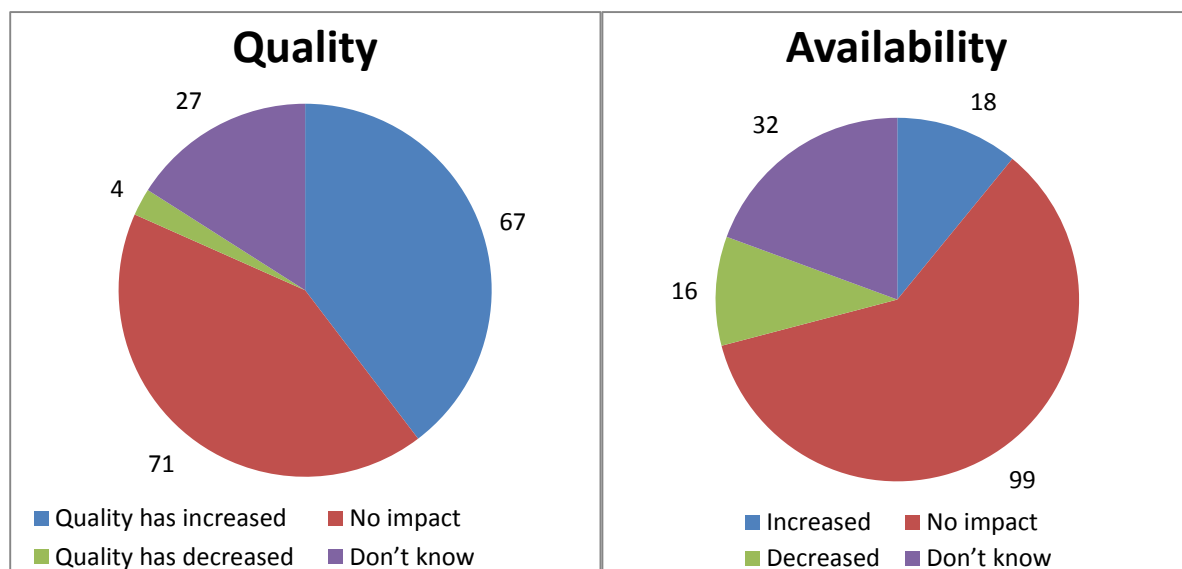


Figure 6: In your opinion, how have end-of-waste criteria impacted market for scrap? (169 respondents)

Analysis of international trade statistics for scrap metal does identify an increasing trend for the export of scrap to outside the EU. However, the start of this trend seems to have occurred quite a few years before the introduction of end-of-waste criteria – during the global financial crisis or even earlier.

On prices, the general consensus was that there may have been limited impact so far, with most companies identifying no price difference between end-of-waste compliant scrap and non-compliant scrap, or not knowing the impact (Figure 7). However, some companies thought that market prices had generally risen, with the perceived price premium for end-of-waste compliant scrap over non-compliant scrap of the same quality estimated at around 1 %. Results from the econometric analysis of scrap price movements seem to support these claims, although the results are statistically inconclusive.

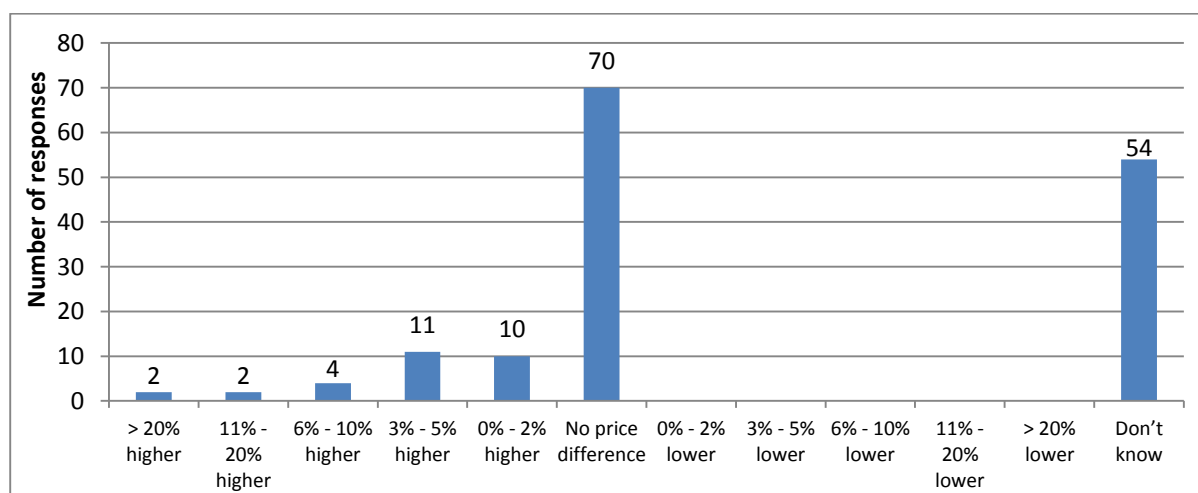


Figure 7: Is the price of end-of-waste scrap higher than non-compliant scrap? (153 respondents)

Monitoring

On the monitoring of the Regulation, Member States Competent Authorities were asked their perception of the Regulation's impact on administration and the environment. The survey results revealed that fewer than half of the Competent Authorities collect any information at all on end-of-waste producers (Figure 8), mostly because it is not a legal requirement to collect data or because no companies are end-of-waste compliant in the country. The other authorities mostly collect company or QMS details.

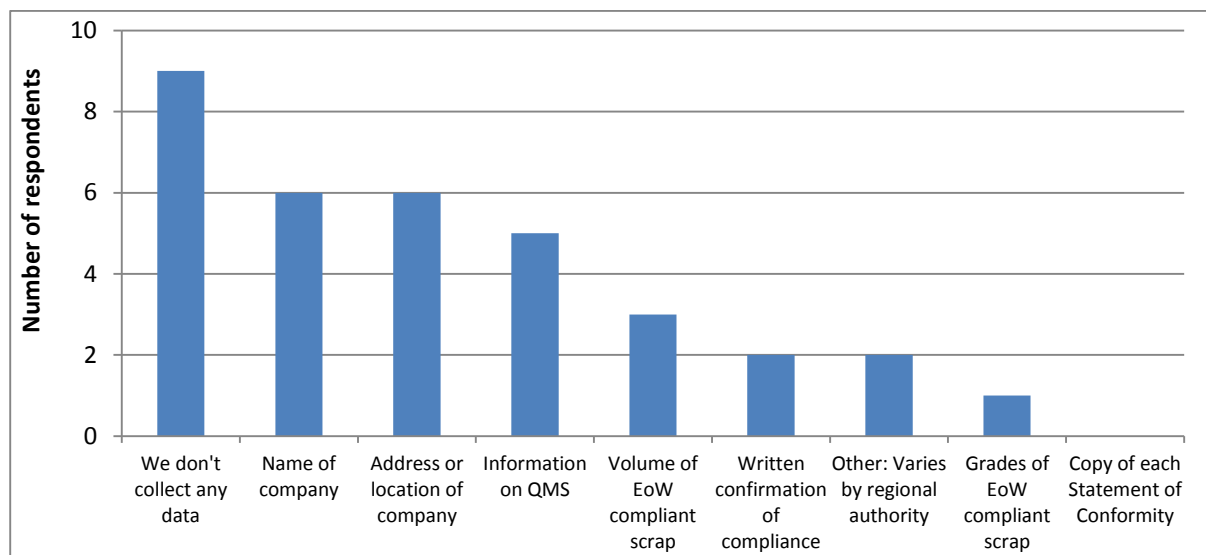


Figure 8: What data do you collect from end-of-waste producers? (16 respondents)

Opinion was divided on whether there was a need for more monitoring, although a number of authorities suggested that administrative requirements had actually increased following the introduction of end-of-waste regulations (Figure 9), mostly due to transition costs. Almost no environment and human health incidents had been reported for scrap metal (whether involving compliant or non-compliant scrap).

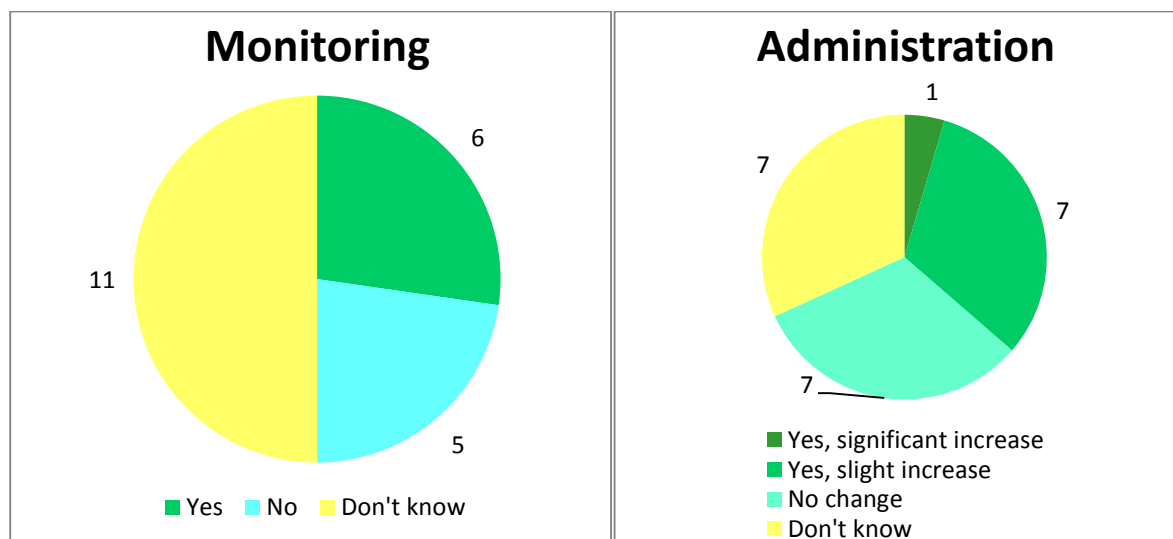


Figure 9: Is there need for more monitoring?; How has it affected administration? (22 respondents)

At the expert workshop participants debated several ideas for a future monitoring system. One key conclusion was that there is no urgent need to revisit monitoring in the near future, due to the relatively modest rate of uptake outside Italy and the very few, if any, negative impacts observed so far. A repeat of the industry and authorities' surveys in 2-3 years times was deemed to be the most appropriate way to monitor end-of-waste for scrap metal, and copper scrap could be added to the scope of that exercise.

1 Introduction

1.1 Policy context

This study is the next phase in an important process by the European Commission for developing and implementing criteria to determine when a waste ceases to be a waste and becomes a product. The purpose of end-of-waste criteria is to:

- promote high quality recycling of secondary raw materials, reduce the consumption of natural resources and reduce the amount of waste sent for disposal
- ensure a high level of protection to the environment and human health
- provide legal certainty for investment decisions and the treatment of waste
- reduce administrative burdens associated with complying with waste regulations
- help the functioning of the internal market by harmonising procedures at a European level.

Provisions were made for developing end-of-waste criteria in the *Thematic strategy on the prevention and recycling of waste* in 2005, which was adopted into EU law within the *Revised Waste Framework Directive* in 2008. Following an evaluation of several waste streams^a, scrap metals recycling markets were targeted as a priority waste stream which would benefit from the development of specific EU end-of-waste criteria. Consequently, scrap from iron and steel, aluminium and aluminium alloys were the first waste streams to have EU end-of-waste criteria published. These came into force on 9 October 2011 under *Council Regulation EU 333/2011*, which spelled out the specific recovery operations required when these scrap metals cease to be waste.

The main provisions within the EU end-of-waste criteria for iron and steel scrap, aluminium and aluminium alloy scrap can be summarised as the following requirements:

- scrap complies with industry standards or specifications
- metal scrap fulfils the requirements for maximum content of contaminants including oil, oily emulsions, grease or lubricants, radioactivity and PVC
- metal scrap does not have hazardous properties
- metal scrap has completed all required treatments to be suitable for direct use
- the producer of metal scrap has implemented a quality management system
- the producer of metal scrap provides documentation of the fulfilment of all conditions above, by issuing a statement of conformity.

During their development it was noted that these end-of-waste criteria could possibly influence the scrap and metal markets. A specific concern was that the Regulation might increase scrap exports from the EU and create a deficit of metal scrap in Europe. For these reasons, it was recommended that attention should be paid to impacts of the Regulation on the supply of secondary raw materials to European industries and the effects on the wastes management sector and recycling markets. The EU is already a significant exporter of both steel and aluminium scrap, and exports have increased over the past years.

The Regulation therefore included a provision for monitoring the development of market conditions for iron and steel scrap and aluminium scrap in response to the end-of-waste criteria to check whether any adverse effects have occurred. Recital 5 of the Regulation states:

A review of the criteria may prove necessary if, on the basis of a monitoring of the development of market conditions for iron and steel scrap and aluminium scrap, adverse effects on recycling markets for iron and steel scrap and aluminium scrap are noted, in particular with regard to the availability of, and access to, such scrap.

^a See EC JRC IPTS (2008), End of Waste Criteria & EC JRC IPTS (2009), Study on the selection of waste streams for End of Waste assessment

1.2 Aims and objectives

In this context, the EC JRC-IPTS undertook a feasibility study on how a monitoring system would operate.^a Given that iron, steel and aluminium scrap were the first waste materials to have end-of-waste criteria published, this is an important study for evaluating the market penetration of the end-of-waste concept and for providing possible recommendations for current and future end-of-waste criteria. In particular, the present study focuses on whether there are indications that, since the launch of the criteria in October 2011, any progress has been seen in realising the objectives of stimulating recycling and recovery, ensuring protection of the environment, boosting investment and economic activity, providing legal certainty, and reducing administrative compliance.

The primary objective of this monitoring study was therefore to investigate the development of market conditions for iron, steel and aluminium scrap following entry into force of Regulation 333/2011. It focuses on the effects of the Regulation on recycling markets for iron and steel scrap and aluminium scrap, in particular with regard to the availability of, and access to, such scrap. It also identifies the acceptance and uptake of the end-of-waste concept by the industries, and highlights any observed environmental incidents linked to the Regulation.

The two major research areas to be reflected in the monitoring study were:

- What is the impact of Regulation 333/2011 on the supply of secondary raw materials to European industries and upon recycling markets (including exports)?
- What is the impact of Regulation 333/2011 on the operating conditions for the waste management sector and the Member State Competent Authorities? Can any environmental or human health incidents be linked to the introduction of Regulation 333/2011?

It was recognised that the data which currently exists may be representative for only the first phase of the introduction of the end-of-waste concept into the scrap market. Therefore an additional part of this study consisted of developing a robust system for future data collection, to facilitate up-coming monitoring actions to analyse the on-going effects of the introduction of Regulation 333/2011 on iron and steel scrap and aluminium scrap markets. This included recommendations on what data needs to be collected and – hopefully - commitments from specific organisations for this on-going monitoring.

1.3 Report structure

The structure of the report is the following:

- Chapter 1 (this chapter) provides an introduction to the study, policy context, aims and objectives.
- Chapter 2 describes the study methodology, data collection and data analysis approach taken.
- Chapter 3 provides a brief industry background to the scrap iron/steel and aluminium industries. This includes headline data on scrap generation, use, trade and prices.
- Chapter 4 provides the results of the industry survey, including giving information on the uptake of end-of-waste criteria, geographically, over time and by grade of scrap. This chapter also covers the opinions of industry operators on the impact of the end-of-waste criteria.
- Chapter 5 analyses the quantitative impact of the introduction of the end-of-waste criteria on recycling markets. This is used as a cross-check of the results of the industry survey.
- Chapter 6 presents the results of the survey of Competent Authorities, including the impact of the Regulation on administration, environment and human health.
- Chapter 7 outlines the system for monitoring the Regulation in the future, covering feedback from the stakeholder workshop and commitments that have been made by relevant organisations.
- Chapter 8 provides the draft conclusions and some recommendations of the study.

^a See EC JRC IPTS (2012), Monitoring study for metal scrap in relation to Community end-of-waste criteria laid down in Council Regulation EC 333/2011

2 Study methodology

2.1 Definition of indicators

This study sought to assess the uptake, effectiveness and impact of the introduction of end-of-waste criteria for scrap iron, steel and aluminium. Therefore the study has collected, analysed and monitored data on specific indicators relating to recycling markets, administration, environment and human health.

The study reviewed and built upon the feasibility study undertaken by JRC IPTS for DG Environment on how to monitor the impact and effectiveness of the End-of-Waste Regulations.^a Given that this was the first monitoring study, there was a degree of freedom in developing and elaborating a methodology.

2.1.1 Influence on recycling markets

To measure the influence of Regulation 333/2011 on the recycling markets, indicators were proposed for the applicability of the Regulation (amounts of scrap and number of companies), as well as the availability of scrap (prices, trade, consumption etc.). A number of qualitative indicators were also proposed relating to the general opinion of the end-of-waste criteria, such as those on quality and entering new markets. These proposed indicators are summarised in Table 1.

Table 1: Proposed indicators for monitoring influence on recycling markets (MS=Member State)

Applicability indicator	
Amounts of waste scrap versus end-of-waste scrap generated by processors per scrap category	tonne/year
Amounts of waste scrap versus end-of-waste scrap used by the industry per scrap category	tonne/year
How many companies applied for the end-of-waste status (focussing on scrap processors) and in which countries?	number/MS
Availability indicator	
EU scrap prices per category (split into waste scrap / end-of-waste scrap)	euro/tonne
Scrap consumed in EU per category (split into waste scrap / end-of-waste scrap)	tonne/year
Scrap exported from EU per category (split into waste scrap / end-of-waste scrap)	tonne/year
Scrap imported into EU per category (split into waste scrap / end-of-waste scrap)	tonne/year
Intra-EU trade of scrap per category (split into waste scrap / end-of-waste scrap)	tonne/year
Did the implementation of end-of-waste criteria allow [you] to enter new markets?	qualitative
What is the general opinion of scrap users about waste / end-of-waste scrap availability?	qualitative
Did the quality of scrap on the market improve thanks to the implementation of quality management for end-of-waste scrap producers?	qualitative

EC (2012), Monitoring study for metal scrap in relation to Community end-of-waste criteria laid down in Council Regulation EC 333/2011

2.1.2 Influence on administration, environment and human health

A range of qualitative indicators of the influence of the Regulation on administration and on environment and human health were proposed for this study (Table 2). For administration, the indicators include the activities of Member States to implement, register and monitor the introduction of the Regulation, and its effect on the administrative burden. The environment and human health indicator focused on environmental control and the occurrence of incidents related to the Regulation.

^a See EC JRC IPTS (2012), Monitoring study for metal scrap in relation to Community end-of-waste criteria laid down in Council Regulation EC 333/2011

Table 2: Proposed indicators for monitoring influence on waste management sector, authorities, environment (MS=Member State)

Administrative indicator	
What are the main activities by MSs to implement the Regulation?	qualitative
How can MSs ensure effective follow-up of the Regulation?	qualitative
What are the difficulties encountered by MSs upon implementing the Regulation?	qualitative
What is the administrative burden/cost related to the implementation of the Regulation for the authorities?	qualitative
Did the administrative burden for the industry increase/decrease for end-of-waste scrap versus waste scrap?	qualitative
Environment and human health indicator	
How far are the Competent Authorities able to maintain effective control on environmental- or health-related requirements?	qualitative
Have any environmental/human health incidents been reported related to end-of-waste scrap that would not have been caused with waste scrap?	qualitative

EC (2012), Monitoring study for metal scrap in relation to Community end-of-waste criteria laid down in Council Regulation EC 333/2011

2.2 Data collection

A major part of this study was to collect the data required to measure the impact of the Regulation on each of these indicators. Some of the headline data relevant for this study was already publicly available through official and trade statistics. However, a key part of this study was to distinguish between waste scrap and end-of-waste compliant scrap, which the official statistics make little distinction between.

2.2.1 Existing datasets

A considerable amount of data was collected and made available through the key industry associations including Eurofer, European Aluminium Association (EAA), Organisation of the European Aluminium Recycling Industry (OEA), Bureau of International Recycling (BIR), European Ferrous Recovery & Recycling Federation (EFR), European Metal Trade and Recycling Federation (EUROMETREC), European Federation of Waste Management and Environmental Services (FEAD) and Municipal Waste Europe.

Official statistics for waste generation and international trade were available from Eurostat and were analysed for this study. In addition, price data from specialist press (Metal Bulletin) was subscribed to and analysed in the course of the study. Table 3 summarises the available data for the quantitative indicators, including identifying the source organisations, data frequency, geographic detail and the number of categories/grades. At present, none of the available data distinguishes between waste and end-of-waste compliant scrap, and there are differing levels of detail on each indicator.

Table 3: Review of data availability for quantitative indicators

Indicator	Unit	Source organisations	Frequency	Geographic detail	Categories/grades
Generation	tonnes	Eurostat waste statistics or calculated from below	Annual	Member State	Total only
Consumption	tonnes	Eurofer, EAA	Quarterly	Member State	Total only
Prices	€/tonne	Eurofer, Metal Bulletin, EAA, LetsRecycle etc.	Monthly	EU, UK, Germany, US etc.	Approximately 15 grades
Trade	tonnes	Comext-Eurostat	Monthly	Member State	Broad categories

The study therefore sought to build upon these existing sources of information by reviewing the available data. By building upon and disaggregating the available data, the study offers greater transparency and improved potential to continue monitoring the impact of the Regulation. However, this review of existing data also identified that considerable effort was required for further primary data collection.

2.2.2 Stakeholder contact

Data was collected through direct contact with stakeholders from industry and Competent Authorities in two detailed surveys which were commissioned. Relevant industry associations were also contacted at the very earliest stage of the project to see what assistance they and their members might be able to provide. Meetings were held in Brussels with Eurofer, EAA and BIR. A discussion was also held over the phone with IMPEL, the European Union Network for the Implementation and Enforcement of Environmental Law. All of these organisations were supportive of the study and said that they would encourage their members to participate. Some also provided specific comments on the content and structure of the draft surveys.

Towards the end of the project, an expert workshop was held for around 30 invited experts to comment on the findings of the study. The list of invitees included:

- contacts from the network established during the study
- Member States' delegates from across the main geographical areas of the EU28
- representatives from the major industry associations for iron, steel and aluminium
- experts from the Technical Working Groups previously established by the EC for the development of end-of-waste criteria for iron, steel and aluminium scrap
- stakeholders who may undertake a key role in future monitoring programs.

Industry survey

The first survey was aimed at industry stakeholders. This covered both the scrap industry and steel and aluminium works. The survey design was tailored to the industry sector and company size, to cope with (for example) the small and numerous scrap collectors and dismantlers and the large furnace operators and remelters. Industry associations were also able to submit surveys and data, whether online or directly by email.

To ensure successful participation in the survey, it was carefully designed to make it accessible and easy to fill in. The survey included a combination of open and multiple choice questions, for qualitative and quantitative information etc. In addition, the survey needed to be careful with respect to the type and level of detail requested for quantitative information. It was initially envisaged that the data collected would be disaggregated to a monthly level for each Member State and split into the different scrap categories commonly recognised on the market. However, it was deemed to be impractical to ask survey respondents from industry to report this level of detail.

A key concern was that much of the requested data might be considered to be confidential or sensitive. To mitigate this risk, participants were allowed to choose to be anonymous in their responses and to report their company size within ranges, rather than to provide actual data. This made it easier to complete the survey, as participants did not need to look up actual data, but could provide ready-to-hand estimates. In addition, the survey introduction was clear on how the data would be used and aggregated, and provided contact details in the case of any queries. Participants were also offered the option to provide the data through their umbrella industry association.

In addition to the quantitative questions, quite a large number of qualitative questions were included to try to understand why the respondents had decided to use the end-of-waste criteria (or not) and whether (or not) they find them useful in creating additional market opportunities, or in improving market prices, quality etc. It was expected that industry participants would be more likely to provide this type of information than commercially sensitive market data.

The online survey was offered in French, German, Italian and Dutch in addition to English, with the aim of boosting the survey response rate. The survey was then disseminated through the industry associations along with a covering supporting letter from the EC's JRC-IPTS to explain its purpose and to outline why

industry participation was requested. Follow-up to the survey, by telephone and email, then helped to further maximise the response and coverage of the survey.

Competent Authorities survey

The second survey was aimed at EU Competent Authorities dealing with end-of-waste issues across the Member States. These included representatives from Federal Ministries, Environment Protection Agencies, Customs Authorities and Regional Authorities. Collection of this data could therefore include a wide range and number of organisations across the EU. The IMPEL network helped greatly in identifying the relevant stakeholders and effectively signposting the best contacts for each type of data to be collected, although surveys were also disseminated through the DG Environment Waste Framework Directive (WFD) Technical Advisory Committee (TAC).

Much of the requested data was of a qualitative nature; however, the initial list of proposed indicators was expanded considerably to get a greater level of detail in the information received. The picture was further complicated by the fact that Member States are not mandated to collect specific records on the conformity of end-of-waste scrap. In practice some of the Member State organisations did collect these records, and they were given the opportunity to send copies of this information for inclusion in the analysis.

2.3 Data analysis

The data gathered was checked, verified and analysed. All the data presented, together with inferences and recommendations drawn from the data, were sense-checked. Results were presented graphically such as in maps, graphs and tables, together with interpretation to provide concise and clear commentaries to the data and results obtained.

Qualitative data analysis

The qualitative data was analysed and presented to bring out common findings from participants' responses. This highlighted Member States' common and differing approaches to implementing the Regulation. This information will be useful in informing the continuing monitoring scheme. The analysis also highlighted differences which were apparent between different types of industry operators (for instance, between large or small scrap dealers), the likelihood that they would be certified against end-of-waste criteria, and which particular grades of scrap were more likely to be affected.

The impact of Regulation 333/2011 may be relatively small compared to other market trends, such that the quantitative data may not be able to identify discernible and attributable statistical trends that can be specifically correlated with its introduction. The analysis of the qualitative indicators therefore helped considerably in analysing the quantitative impacts of the Regulation.

Quantitative data analysis

Precise investigation of the impacts arising from the introduction of Regulation 333/2011 required detailed independent data analysis. The statistical analysis included multiple regression techniques in SPSS software. The first task was to establish the clear baseline relationships that are evident in the data, including the strong correlations that are evident between the key variables, such as the world economy and virgin raw material prices.

Once this baseline model was calibrated it was possible to analyse to what extent the introduction of the Regulation has apparently affected the market, after controlling for all other relevant factors. This included a trend-break analysis, which effectively allowed determination of the before-and-after effect of the Regulation in the quantitative variables. As a result of this analysis, a clear distinction was made between other market trends and the impact that is attributable to the Regulation.

This type of careful statistical analysis of variance was conducted to measure the main factors and uncertainties influencing the collected data indicators. A clear listing was provided for all of the factors

identified, including their statistical importance (as measured by standard errors, t-statistics and t-tests) and their relative magnitude. This included tests on whether the introduction had a statistically significant impact on the market, as well as the magnitude of its impact.

3 Industry background

As an introduction, it is useful to provide some brief background statistics on the scrap iron and steel and aluminium industries. This chapter includes a selection of high-level statistics relating to the size, volume and structure of the industries to give some context to the results and information in the later chapters.

In general, metal recycling is a pyramid industry with many small companies at the bottom feeding scrap to large multinationals at the top (Figure 10).

According to the *Eurostat Structural Business Statistics* for 2011^a, there are approx. 20,000 enterprises across the EU28 involved in collecting, sorting and recovering waste; with around 6,000 enterprises involved in waste treatment and disposal. These businesses are often diverse, with many collecting iron, steel and aluminium, as well as a range of different types of scrap metal and other recyclables (plastics, paper, glass etc.). Total turnover across these sectors amounted to around €150 billion for the EU28 in 2011, and they employ over 800,000 people.

Major sources of scrap steel and aluminium include construction and demolition, transport and automotive, machinery, mechanical engineering, electrical appliances and packaging. Once collected, recycling scrap metal will involve a number of processes including: sorting, dismantling, shredding, separation and shearing before scrap is baled and compacted for transportation to secondary smelters.

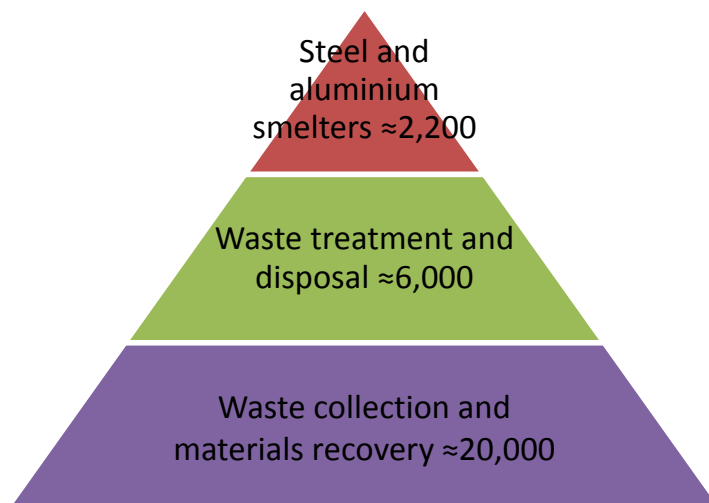


Figure 10: Number of scrap actors in Europe, 2011

Source: Eurostat Structural Business Statistics – Detailed Enterprise Statistics

In comparison, there are far fewer enterprises involved in smelting steel and aluminium (both primary and secondary). The *Eurostat Structural Business Statistics* for 2011 shows there are approximately 2,200 enterprises across the EU28 involved in the manufacture of basic iron and steel and ferro-alloys, with a total turnover of around €170 billion and employing over 350,000 people. Eurostat statistics identify around 1,500 enterprises involved in aluminium production, with a total turnover of around €45 billion and generating over 100,000 jobs.

The next two sections provide some specific facts and statistics relating to the scrap iron/steel and aluminium sectors separately.

^a The most recent version available at the time of the study

3.1 Scrap iron and steel

3.1.1 Volumes

Steel is a very widely used material; its major markets in the EU are construction, mechanical engineering and automotive. Recent figures from Eurofer indicated that, in 2012, European steel mills produced nearly 170 million tonnes of crude steel. The European steel industry consumed around 95 million tonnes of scrap iron and steel in 2012, meaning that production from scrap accounted for around 55 % of total European production for that year. A summary of key facts and figures for scrap steel is shown in Figure 11. A portion of scrap steel is traded on international markets. Exports of steel scrap from EU totalled around 20 million tonnes in 2012, with imports at around 3.5 million tonnes for the same year. Around 20 % of the total scrap generated is therefore exported to outside the EU.

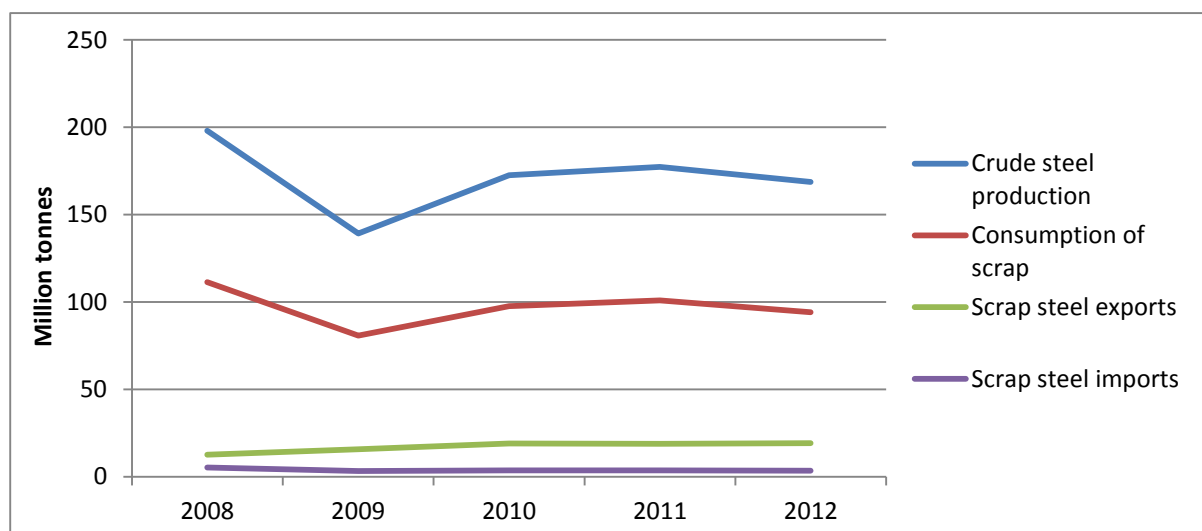


Figure 11: Trends in European steel production, scrap consumption and trade, 2008-2012 (Million tonnes)

Source: Eurofer (2013), *European Steel in Figures: 2008-2012*

3.1.2 Industry structure

Most steel in Europe is produced via two basic routes: the electric arc furnace (EAF) route and the blast furnace/basic oxygen furnace (BOF) route^a.

Blast furnace/basic oxygen furnace route

Blast furnaces produce iron from iron ore. Large European blast furnaces can produce around 4 million tonnes of iron per year. They rely on a chemical process called reduction in which the iron is separated out of the ore (iron oxide) using carbon as a reducing agent. Coal is used as the main carbon-bearing material for steel making. It also generates the high temperatures necessary to smelt the iron ore. The liquid iron is at about 1,500°C when it leaves the furnace.

Since iron is brittle and not easily formable it has to be turned into steel in a second step, using addition of some scrap (up to around 20 %). This takes place in a basic oxygen furnace, also called a converter. Converters can hold up to 400 tonnes of hot metal. In a converter, oxygen is blown onto the liquid iron to burn carbon and silicon which combustion produces heat which at the end melts the scrap (including alloying elements). When this process step is over, the iron has turned to steel. The liquid steel is then cast into solid slabs or ingots and is then processed to long products such as bars or wire or flat steel strip in several rolling operations. Further processes which enhance the characteristics and functionality of the steel include tempering or coating.

^a See Eurofer, *How Steel is made: main production routes* [accessed February 2014]

Electric arc furnace route

EAFs produce steel mostly from a feedstock of scrap steel, although they can also smelt solidified iron or sponge iron. The typical capacity of an EAF is about 1.5 million tonnes per year. The heat necessary for melting the metal comes from an electric arc that arises with the current that passes through the graphite electrodes. Arc temperatures can go as high as 3,500°C, while the temperature of the molten metal is about 1,800°C. EAFs can produce all kinds of steels from metal for basic products such as reinforcing bars to stainless and high alloyed special steels, where flexibility and smaller capacities are advantages. Further process steps such as casting and rolling are similar to those used in the BOF route.

Statistics from Eurofer indicate that just over 40 % of European crude steel production comes from the EAF route, with the remaining 60 % produced from the BOF route or other processes. However, this ratio varies considerably by EU Member State, with around 70% of Italian steel production coming from EAF and only 30% from BOF. Given that EAFs almost exclusively use scrap as a feedstock, this helps make Italy the Europe's largest consumer of scrap steel at 18 million tonnes of scrap consumption. Similarly Spanish steel production is up to 80% scrap content due to the large number of EAFs in that country.

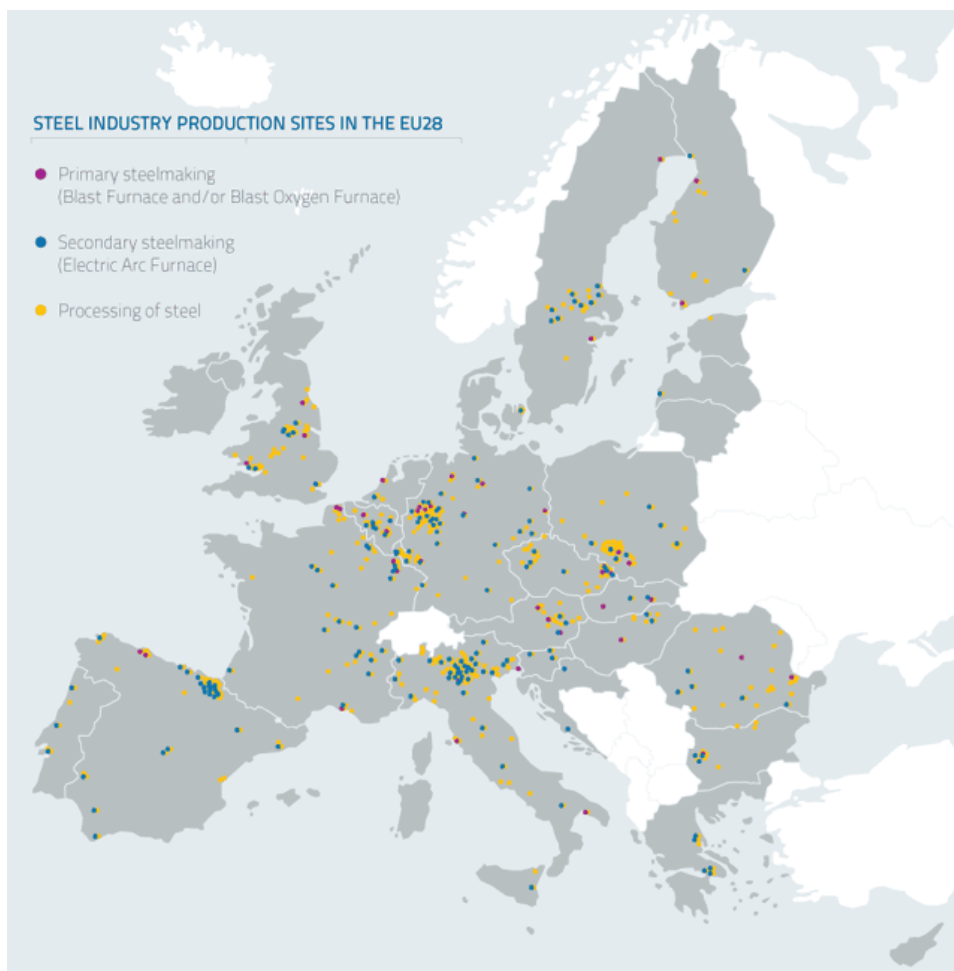


Figure 12: European steel map

Source: Eurofer [accessed February 2014]

Figure 12, above, shows the European Steel Map, identifying the type and location of steel industry production sites across the EU28. The most significant steel producing countries in the EU are Germany (25 %), Italy (16 %), France (9 %) and Spain (8 %). It is also noticeable that there are particular clusters of EAF, i.e. production from scrap, in Northern Spain and Italy.

3.1.3 Trade and prices

The main trade flows of scrap steel to outside the EU are shown in Figure 13. Turkey is the major destination for the EU's exports of scrap steel, accounting for 11 million tonnes (nearly 60 % of total EU exports) in 2012. Other important destinations in 2012 included India, Egypt and China. Given the large number of primary/BOF plants relative to the number of EAF plants, and high scrap generation in Europe, it is not surprising that Europe is a large exporter of scrap to these countries.

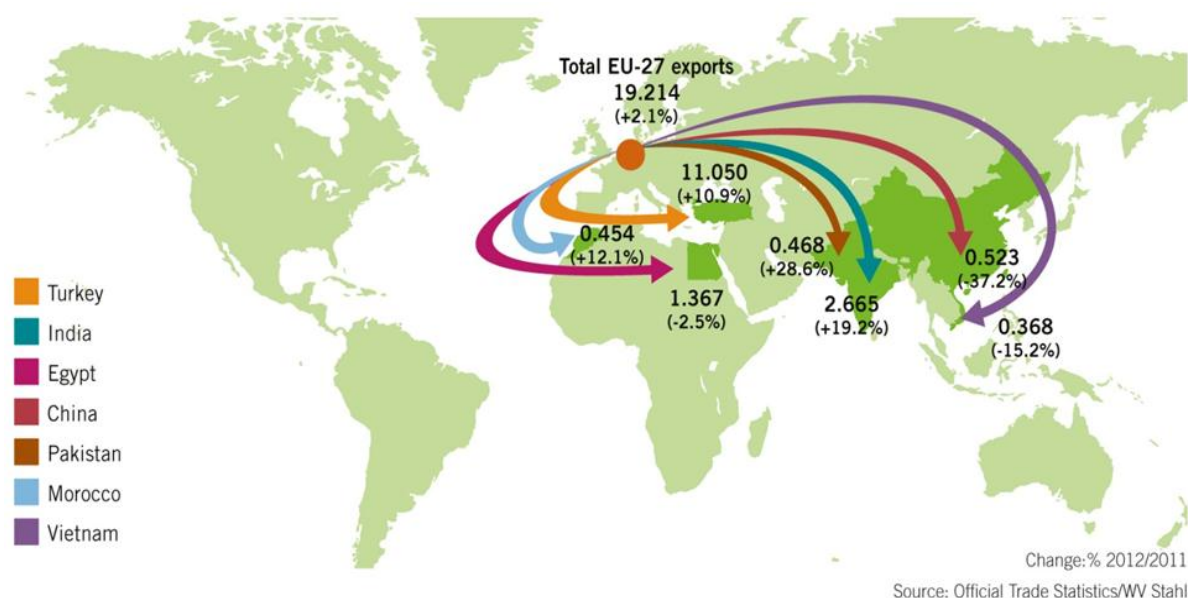


Figure 13: Main flows of EU27 steel scrap export, 2012 (million tonnes)

Source: EFR/BIR Presentation (March 2013), EU-27 Steel Scrap Statistics; Willeke R.

As for the prices of scrap iron and steel, there are at least a dozen different grades for which historical price data is available. Different EU countries have their own benchmark grades. Depending on quality, scrap steel has been trading for the last few years at around €100-€200 per tonne (Figure 14). It is notable that there was a large ramp up in scrap prices during 2008 in response to strong demand from emerging markets. However, this was followed by an 80 % crash in prices at the end of 2008 / beginning of 2009, at the start of the global financial crisis and severe recession in the European economy. Scrap prices have since recovered somewhat, as the world economy has improved.

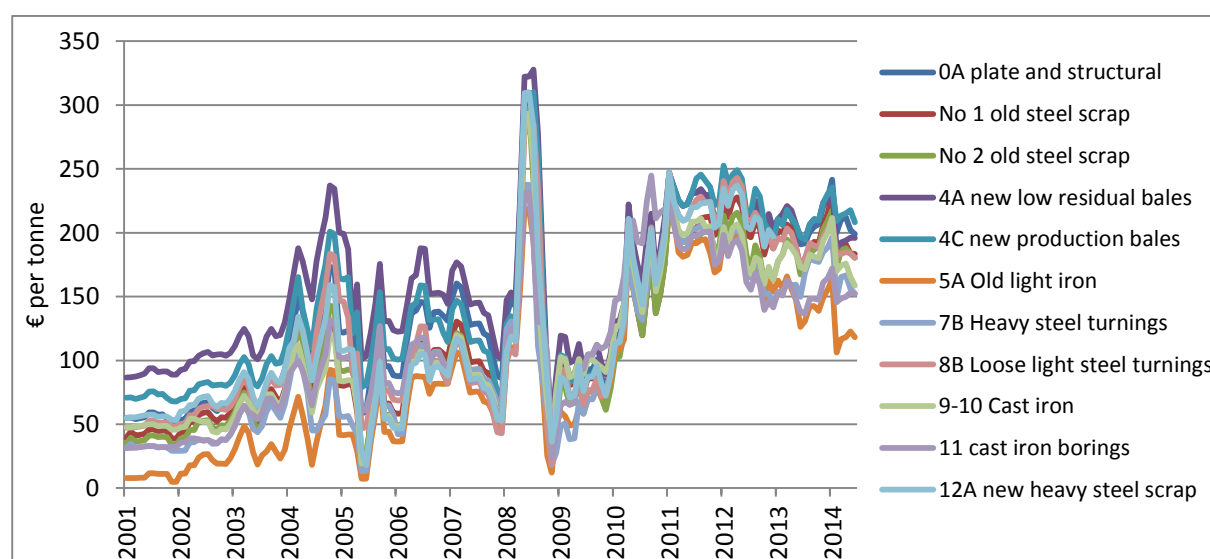


Figure 14: Ferrous scrap price history, by detailed grade, 2001-2014 (€/tonne)

Source: Letsrecycle.com [accessed July 2014]

3.2 Scrap aluminium

3.2.1 Industry structure

The European aluminium industry consists of different actors each with their own type of raw material and products. Table 4 shows the structure of the EU27 aluminium industry in 2010:

Table 4: The structure of the aluminium industry in the EU27, 2010

Operation	Number of operations in EU27	Raw material input	Products / outputs
Bauxite mining	4		Bauxite
Alumina refining	9	Bauxite	Alumina
Primary plant	21	Alumina, master alloy, process scrap	Primary aluminium ingot, billet, slab
Extrusion plant	>200	Billet	Extrusion
Rolling mill	50	Slab	Sheet, strip, foil, plate
Refiner	>150	Post-consumer scrap, process scrap, primary Al. ingot, master alloy	Liquid metal, secondary ingot
Remelter	>100	Process scrap, post-consumer scrap, primary Al. ingot, master alloy	Slab, billet
Caster	>2,000	Secondary ingot, liquid metal, master alloy	Castings
Dedicated master alloy plant (remelter)	6	Primary Al. ingot, process scrap, alloying elements	Master alloy

Source: EAA, Quality Consultants BV

Note: In some cases primary aluminium smelters produce only t-bars and ingots; others produce mainly or only extrusion billets. Some primary smelters produce casting alloys for the automotive industry. The above reflects the normal structure, but exceptions are always possible and depend on the market price and its fluctuations. For example, many secondary smelters in Asia (refiners) are currently using primary aluminium because it is cheaper than imported scrap that has to be sorted.

The first level of actors comprises of the **primary aluminium smelters**, who use the electrolysis process for producing primary aluminium from alumina, a raw material derived from bauxite by the Bayer process. Primary smelters convert the alumina into aluminium via the Hall-Héroult process, which consumes electricity in large quantities. Primary smelters usually produce ingots, slabs, t-bars and/or billets and sometimes molten metal for feeding continuous casters. Some produce ingots dedicated to the automotive industry, thus taking on the traditional refiner role.

Most primary smelters also use some aluminium scrap as a raw material. This can be scrap from their own downstream activities or their customers, or can be traded process scrap that matches the chemical composition of their semi-finished products. Using scrap reduces the temperature of the molten metal from the pot lines; using alloyed scrap enables acquisition of alloying elements relatively cheaply. Using scrap reduces the cost of the semi-finished product (semis) they produce.

The second level of actors is comprises of the **manufacturers**. Rolling mills, extrusion plants, wire rod manufacturers, foil mills and casting plants use the ingots, billets and slabs from primary smelters as raw materials; their outputs are sheet and strip, profiles, wire rod, foil, forgings and castings. These operations generate process scrap that will be fed back to remelters and refiners. Process scrap is also called new scrap.

The secondary aluminium industry, consisting of remelters and refiners, is the third level of actors – so called because these secondary aluminium smelters rely for their material input on the second level producers.

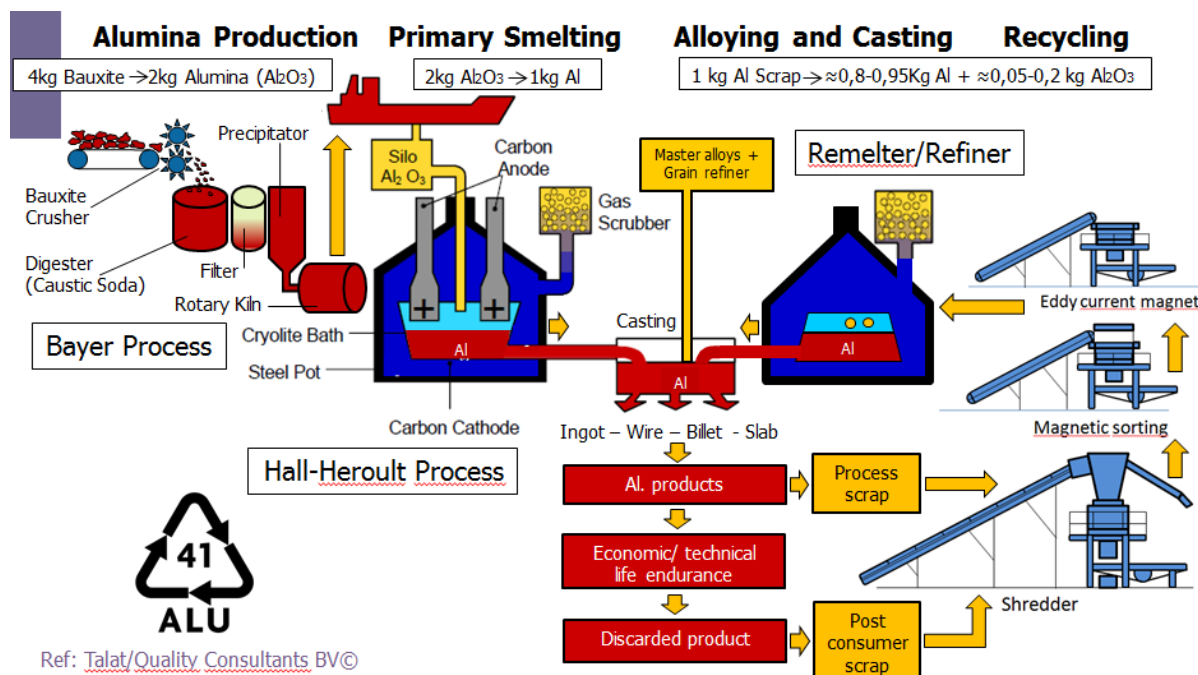


Figure 15: The aluminium industry and its actors (Source Quality Consultants BV, TALAT and BONIJM)

Remelters process aluminium scrap into wrought alloys. The scrap they use as their major raw material is mainly process scrap from manufacturers and downstream fabricators (in the building and construction Industry) as well as some post-consumer scrap (used beverage cans - UBCs - to be processed into rolling slabs). This scrap exists of wrought alloy only. In general, remelters can only process wrought alloy scrap and produce wrought alloy semis, because of the narrow tolerances of the chemical composition of wrought alloy. Remelters produce slab, billet and rod for rolling mills, extrusion plants and rod mills. They are often part of the same down-stream organisation and even sometimes integrated. Master alloy producers are also classified in OEA definitions as remelters.

Refiners process aluminium scrap into casting alloys. The scrap they use as their raw material is mainly process scrap from the automotive industry (casting scrap) together with considerable volumes of post-consumer scrap. Refiners produce ingots and liquid metal to supply die casters and other casting plants to produce aluminium castings. The automotive industry is the largest user of high pressure die castings from secondary aluminium. Refiners can also process wrought alloy scrap and casting alloy scrap, as casting alloys usually have wide tolerances with regard to chemical composition. Their product is casting alloy only. Remelters (and sometimes refiners) use limited volumes of primary aluminium to dilute melts to reach the required chemical composition.

Process scrap or new scrap is that scrap which is generated during the production process and offered for recycling. It is not used as a product and is therefore clean and, because of its origin, has a known chemical composition without contamination. Process scrap is often sold directly to the remelters or refiners in 'tolling' deals without involvement of the scrap trade. Tolling is the direct conversion from process scrap through recycling into new product again. Tolling is paid for by a conversion fee.

Post-consumer scrap or old scrap is generated by discarding end-of-life products. These products are collected, sorted and baled by scrap collectors and dealers, who sell both post-consumer scrap and process scrap to the remelters and refiners. Nowadays large volumes of mainly post-consumer scrap are exported to Asia. The origin of these is not known; usually the metal is used and is not clean, and its chemical composition is not clear. Processing post-consumer scrap is more risky than processing process scrap. There are sophisticated sorting methods such as eddy current, laser induced break-down spectrometry and X-ray that can, in-line, sort the different metals - and sometimes even the different alloys - to allow for a cleaner post-consumer scrap, which is easier to process with reduced risks.

Master alloys are aluminium alloys containing a high content of alloying elements such as Si, Ti, Fe, Cu etc. They are used to change/improve the mechanical properties of the aluminium alloy by hardening or modifying. Some master alloys are used especially to refine the grain of the cast alloy and to improve its mechanical properties (grain refiners).

3.2.2 Volumes, trade and prices

European aluminium consumption totalled 13.2 million tonnes of aluminium metal in 2011, of which 4.7 million tonnes was from primary European aluminium production, 4.3 million tonnes from recycled production with 4.2 million tonnes of net imports.^a In terms of scrap volumes arising, the European aluminium industry generates approximately 5 million tonnes per year (Figure 16), some of which is exported. Most of this (3 million tonnes) is post-consumer scrap. However, process scrap represents a significant proportion of the total at 2 million tonnes arising per year. Large quantities of aluminium are currently in stock and will become available for recycling in the coming years.

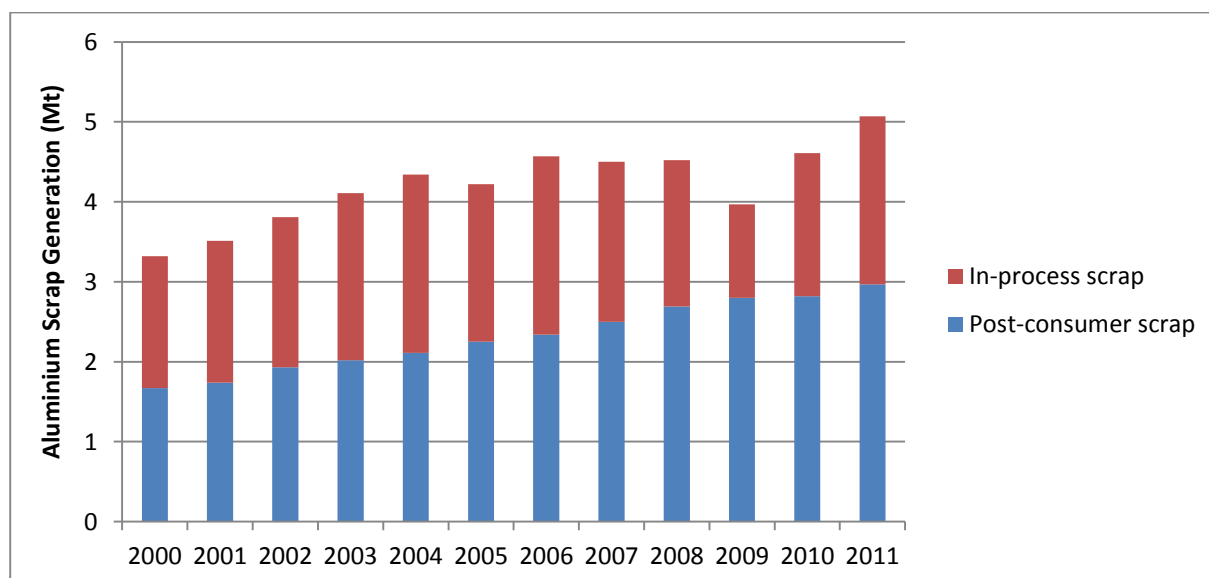


Figure 16: European annual aluminium post-consumer scrap and process scrap generation (Million tonnes)

Source: International Aluminium Institute

In the secondary aluminium industry, besides labour cost, energy and scrap availability are the main factors influencing the profitability of the enterprises operating in this market. Typical examples are clean extrusion scrap and clean wire rod scrap used mainly as an alternative for primary metal. Aluminium scrap prices are typically based on the recovery of the metal. For example, if a scrap metal yield is 80 %, usually the basic scrap price is 80 % of London Metal Exchange (LME) primary (cash) price.

This price is also influenced by the location (transport cost to processing location) and the demand for certain types of scrap. The demand for clean extrusion scrap is high. Therefore the price is not based on the recovery only (96 %) but also on availability. Therefore the price is LME cash plus 5 %, sometimes even 8 %. Most remelters who make billets and slabs from scrap, also need up to 40 %+ primary metal to dilute the molten metal and to correct for chemical impurities in the scrap base.

Remelters usually have to pay a price premium for primary ingot, which can be €220-255/tonne (May 2014) above the LME trade price. Refiners' use of primary aluminium is in most cases limited to less than 5 %. Many do not use primary metal at all.

^a EAA Statistics <http://www.alueurope.eu/aluminium-sector-in-europe-2010/> [accessed February 2014]

The secondary smelter's production cost is also influenced by the cost of energy. Although considerably less energy is used per tonne by secondary smelters than by the primary industry, it is still an important price factor which has been increasing over the years. Most European secondary smelters, particularly the ones using older technology, have seen an increase in production cost and the cost of raw materials (scrap) resulting in costs that are approaching sales prices, leaving little room for investments and/or profits. The secondary smelters who are applying new technologies such as new burner technology, dedicated furnaces and state-of-the-art sorting technology and who have diversified scrap sources - partly into post-consumer scrap - are able to make profits. Unfortunately, many remelters and refiners in Europe are not state-of-the-art because of limited profitability and lack of funds to invest.

The EU also exports significant quantities of aluminium scrap (see the major aluminium scrap trade flows summarised in Figure 17. These scrap exports consist mainly of post-consumer scrap, although there is an increasing trend in exporting clean process scrap, especially in casting alloys. In 2013, approximately 0.6 million tonnes of scrap were exported from Europe, which represents around 12 % of the total EU aluminium scrap generated. However, this represents a reduction in exports over the last three years and was due to the smaller quantity of scrap generated in Europe, and the global economic crisis that also hit production in south-east Asia. Although new secondary smelters are built in Europe, the focus is on the recycling of process scrap into casting alloys and post-consumer scrap (UBCs) into rolling slabs for sheet, with relatively few remelters recycling post-consumer scrap into wrought alloys like billets and few refiners purely recycling post-consumer scrap.

Industry analysts expect that India and China will need to import more scrap for domestic use in the near future, due to increased consumption in their building and construction industries and due to the needs of their fast-growing transport sectors. According to the International Aluminium Institute, China produced about 1.3 million tonnes of secondary aluminium in 2002; in 2010 this was increased to 3.8 million tonnes; in 2012 the Chinese secondary industry produced 4.8 million tonnes. It is expected that the secondary production of aluminium in China will increase to 15.7 million tonnes by 2020. Since the aluminium scrap generation in China and in Asia is not sufficient to deal with this demand, aluminium scrap will most likely have to be acquired from outside China in the future.

At present, large (>250,000 tonnes per annum capacity) new secondary smelters are being built in China. These operations have the newest technologies available to them, are ISO 9000 certified. Many of them also have ISO 18000 Occupational Health and Safety Management system certification and include in that management system the OECD Core Performance Elements as published in 2006.

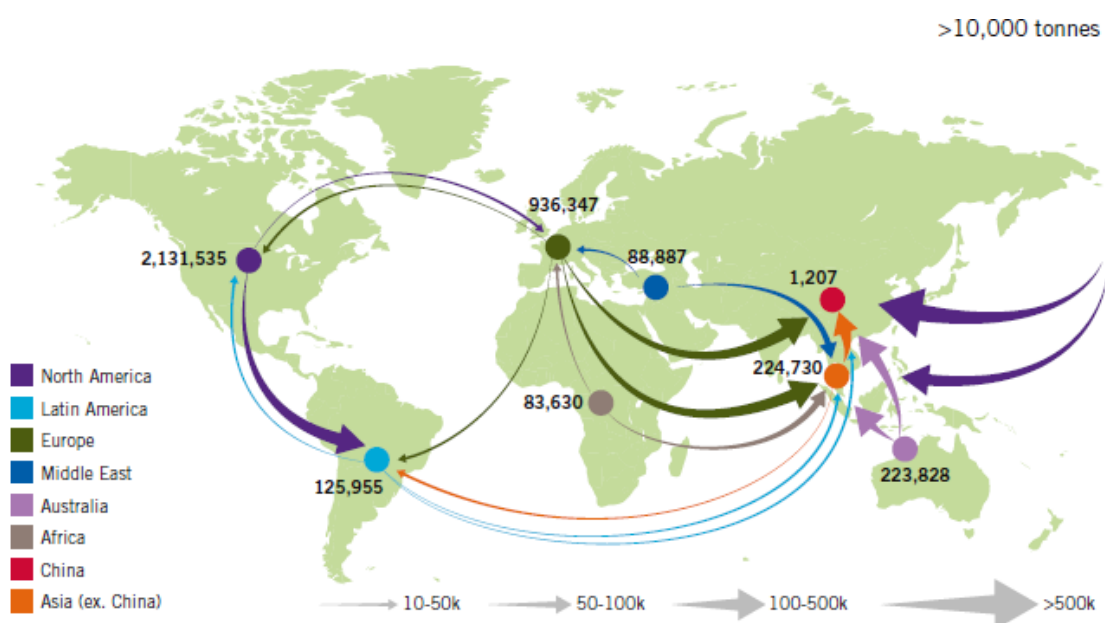


Figure 17: Major aluminium scrap trade flows in 2011; Source BIR/CRU

4 Industry participation in end-of-waste criteria

This chapter summarises characteristics of industry participation in end-of-waste criteria, based on the results of the industry survey. The profile of the industry survey participants is described in section 4.1, with an evaluation of the representativeness of the sample.

The uptake of the end-of-waste criteria is explored in section 4.2 from the perspective of both the scrap industry, which generates and sells metal scrap, and steel and aluminium works, which purchase and use metal scrap. The overall EU estimates are given in Section 4.3, while section 4.4 presents analysis on the perceived benefits of 'end-of-waste', as seen by the scrap and metal industries, and presents their comments on the criteria. Sections 4.5 and 4.6 summarise the opinions provided.

4.1 Profile of industry survey participants

4.1.1 Sampling approach

To encourage industry participation in the end-of-waste survey, the initial approach was through the key umbrella industry associations. This included personal meetings in Brussels at the beginning of the study and introductory emails with:

- Bureau of International Recycling (BIR) and its sister organisations European Ferrous Recovery (EFR) and EUROMETREC. Their members are mostly the national federations in EU Member States, although the BIR also has direct member companies. EFR and EUROMETREC report that they *"represent the interests of commercial firms that are primarily involved in the collection, trade, processing and recycling of non-ferrous metal scrap, with more than a thousand large companies and SMEs are represented in the EU member states."*^a
- Eurofer, the European Steel Association. Eurofer represents 100 % of steel production in the EU, accounting for more than 500 steel production sites in 24 EU Member States (producing approximately 170 million tonnes of steel per year). Its members are steel companies (around 40 direct member companies) and national steel federations throughout the EU.^b
- European Aluminium Association (EAA). Its members represent the aluminium industry in Europe, encompassing primary aluminium producers, downstream manufacturers, producers of recycled aluminium and national aluminium associations (representing manufacturers of rolled and extruded products in 18 European countries). The EAA has around 25 direct member companies, with 50 additional members from the Organisation of European Aluminium Remelters and Refiners (OEA).^c

In addition, to these associations, FEAD was approached (European Federation of Waste Management and Environmental Services). FEAD's members are national waste management associations covering 19 EU Member States and Norway. They have around 60 % of the household waste market and handle more than 75 % of industrial and commercial waste in Europe; with a combined annual turnover of around €75 billion. FEAD represents about 3,000 companies with activities in all forms of waste management: recycling and sorting centres, composting sites, waste-to-energy plants and controlled landfills.^d

These umbrella industry associations were key actors in disseminating the industry survey to companies across Europe to encourage as wide participation as possible in the survey, in some instances providing support to their members in collating responses. In addition, some of the associations provided important feedback on the draft versions of the industry survey.

^a EFR and Eurometrec website <http://www.efr2.org/html/welcome.php> and <http://www.eurometrec.org/html/home.php> [accessed December 2013]

^b Eurofer website, "About Us": <http://www.eurofer.org/About%20us/Eurofer%20Portrait.fhtml> [accessed December 2013]

^c EAA website: <http://www.alueurope.eu/organisation/> [accessed December 2013]. See also EAA Activity Report 2012

^d FEAD website: <http://www.fead.be/> [accessed December 2013]

4.1.2 Representativeness of participation

281 responses to the industry survey were received; 262 were submitted via the on-line web portal, the remaining 19 were submitted via email. The survey was offered in five European languages. The range of languages used in the responses is shown in Figure 18. Over three quarters of the survey submissions were received in Italian; as will be shown later, Italy is the most important country for the uptake of end-of-waste so far. English and French were the next most frequently used languages for the responses. A couple of surveys were submitted in German; none were submitted in Dutch.

However, a considerable number of the on-line survey submissions were incomplete, meaning that for practical purposes the overall survey sample size, i.e. where meaningful and usable data was provided, was 246 responses. Of these 246 responses, 5 were identified as certification bodies and so their responses were collated with the Competent Authority analysis (section 6.1). The sample size for the industry survey participants is therefore 241 respondents.

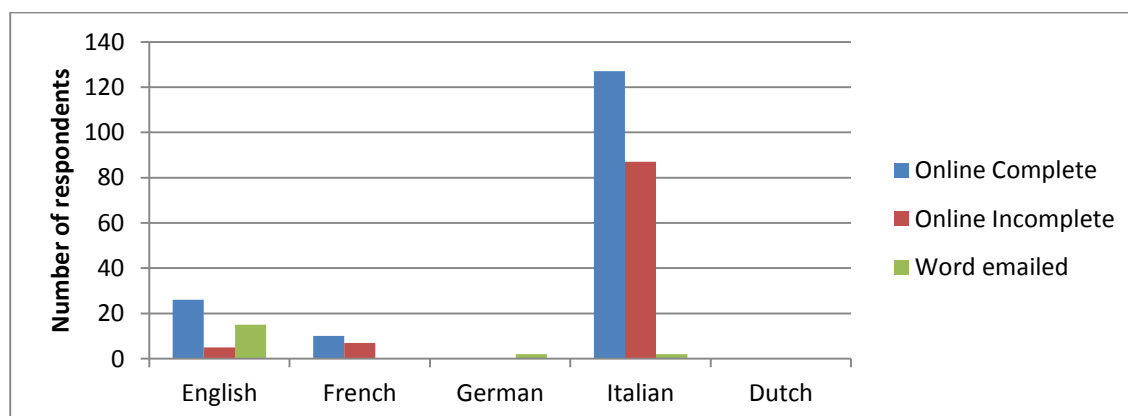


Figure 18: Number of survey submissions by type and language (281 responses)

Figure 19 shows the breakdown of the nature of business for survey participants. Over three-quarters of the participants are from the scrap industry: far fewer responses were received from steel and aluminium works. However, Figure 20 shows that most of the respondents in the scrap industry are small enterprises, with fewer than 50 employees, while the respondents in the steel and aluminium industries have larger workforces: the modal response for aluminium works is 251 to 1,000 employees, while for steel works the modal response is more than 5,000 employees. Therefore, while fewer responses have been received for the steel and aluminium industries, their responses cover a larger workforce.

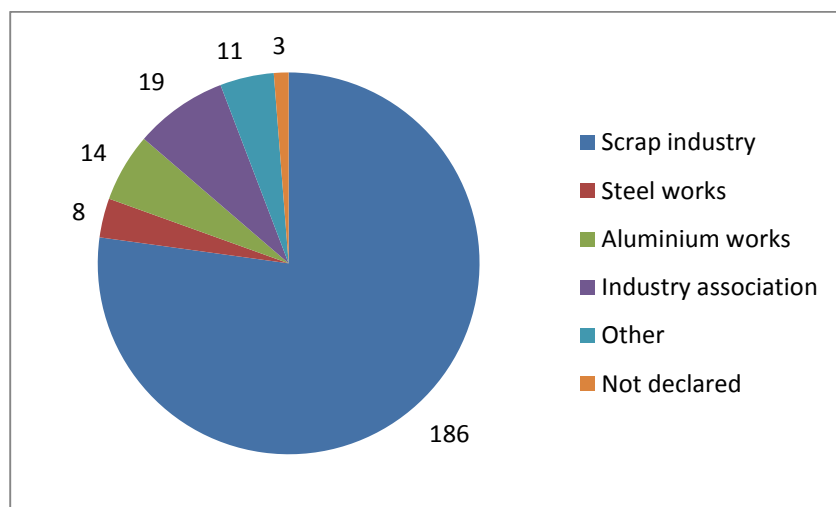


Figure 19: Nature of business for survey participants (241 respondents)

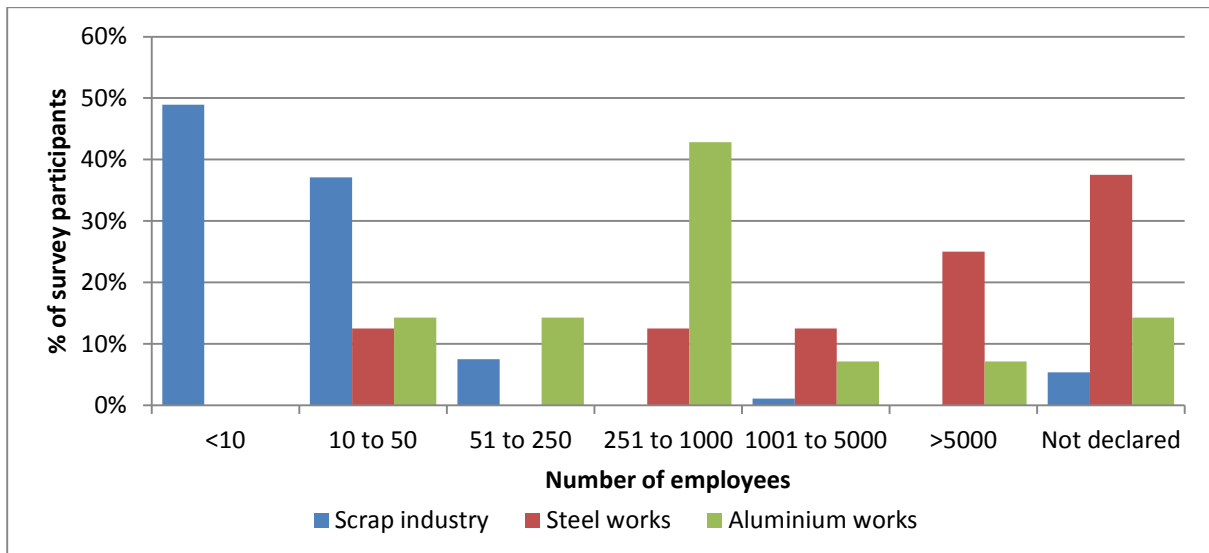


Figure 20: Number of employees for survey participants (%) (208 respondents)

Common across all industry sectors is the observation that more of the participants are active in Italy than in any other territory. Therefore, the survey responses must be interpreted carefully, to ensure there is not a bias towards Italian responses. This potential Italian bias will be most acute in the scrap industry responses: of the 184 respondents who provided information on the Member States that they operated in, 155 operated in Italy (c.f. the next highest regions, France and Germany, with 22 responses), and out of these 155 respondents, 127 operate in Italy alone.

Because of the high proportion of Italian responses, it is helpful to disaggregate scrap industry survey responses between those respondents operating in Italy alone and those operating in the rest of Europe, to observe whether differences in responses may influence the results. For example, Figure 21 shows the breakdown of the number of employees for respondents operating solely in Italy, and those operating in the rest of Europe (ROE). A higher proportion of the responses from the scrap industry operating solely in Italy were from companies with fewer than 50 employees.

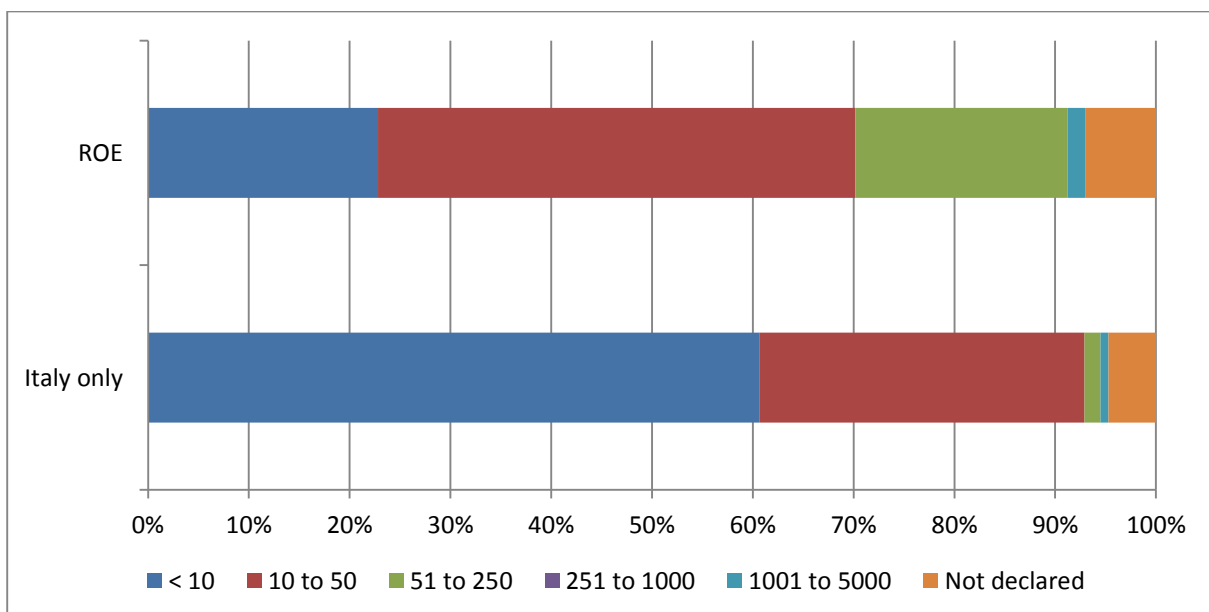


Figure 21: Breakdown of number of employees for scrap industry participants (%) between respondents operating solely in Italy and those operating in the rest of Europe (ROE) (127 respondents for Italy only, 57 respondents for ROE)

A similar picture to the number of employees is shown for the spread of company turnover in Figure 22: the turnover of the scrap industry participants is lower than that of the steel and aluminium respondents. Based on the upper and lower bounds of the responses for company turnover, the total declared income for the scrap industry respondents lies in the range of €3.0–9.6 billion. It is not possible to estimate what proportion of the industry is covered by the survey responses due to uncertainty over the proportion of revenue that arises from steel and aluminium scrap processing.

The total declared income for the aluminium industry respondents covers an estimated €1.5–4.4 billion of industry turnover. The size of the European aluminium industry was reported to be €36.8 billion in 2012^a, and so the survey response is estimated to cover 4-12 % of the industry by turnover.

The total declared income for the steel industry respondents covers an estimated €1.1–2.6 billion of industry turnover. The size of the European steel industry is reported to be about €170 billion, and so the survey response is estimated to cover 0.6-1.5 % of the industry by turnover.

The disaggregated company turnover data in Figure 23 shows that the respondents operating solely in Italy had a lower company turnover, on average, than respondents operating in the rest of Europe.

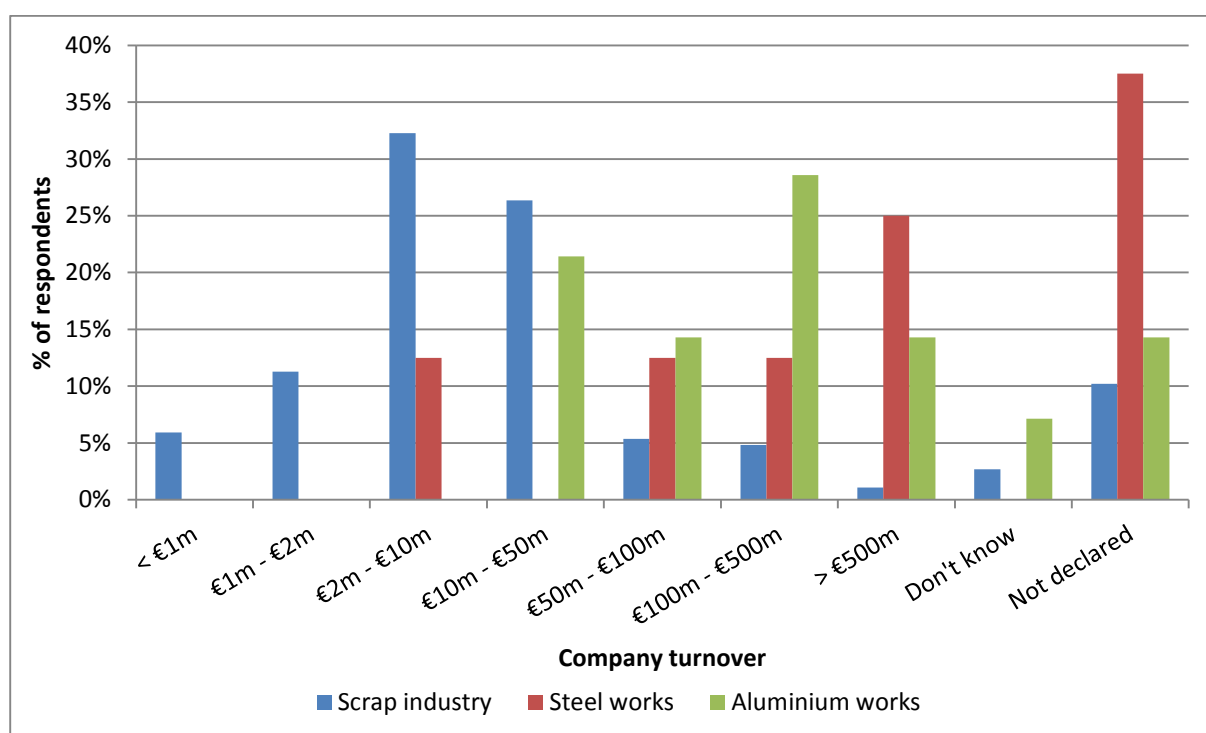


Figure 22: Company turnover for participants (%) (208 respondents)

Figure 24 to Figure 26 illustrate the geographical coverage of the survey respondents. The non-EU coverage of the survey participants is shown in Figure 27. For the scrap industry, non-EU activity primarily occurs in European countries outside of the EU, followed by activity in Asia. The responses for the steel and aluminium industries are fewer, making it harder to identify robust trends; however, several of the respondents are active in non-EU regions.

^a http://www.alueurope.eu/wp-content/uploads/2011/08/EAA-Press-Release_27-NovV2.pdf

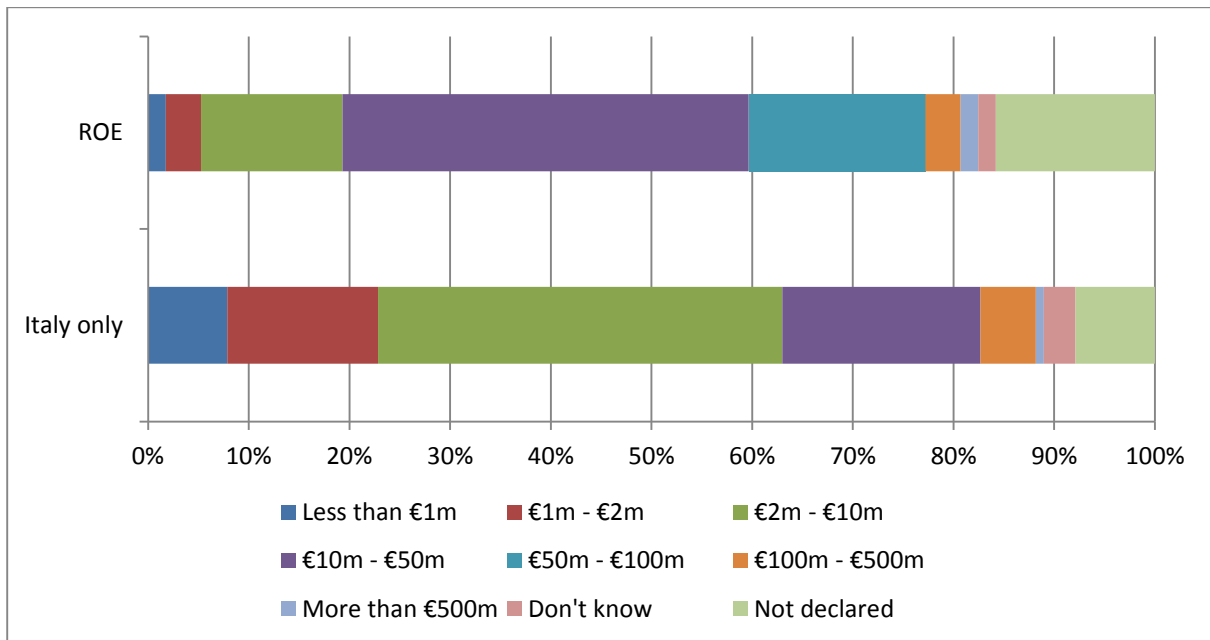


Figure 23: Breakdown of company turnover for scrap industry participants operating solely in Italy and those operating in the rest of Europe (ROE) (127 respondents for Italy only, 57 respondents for ROE)

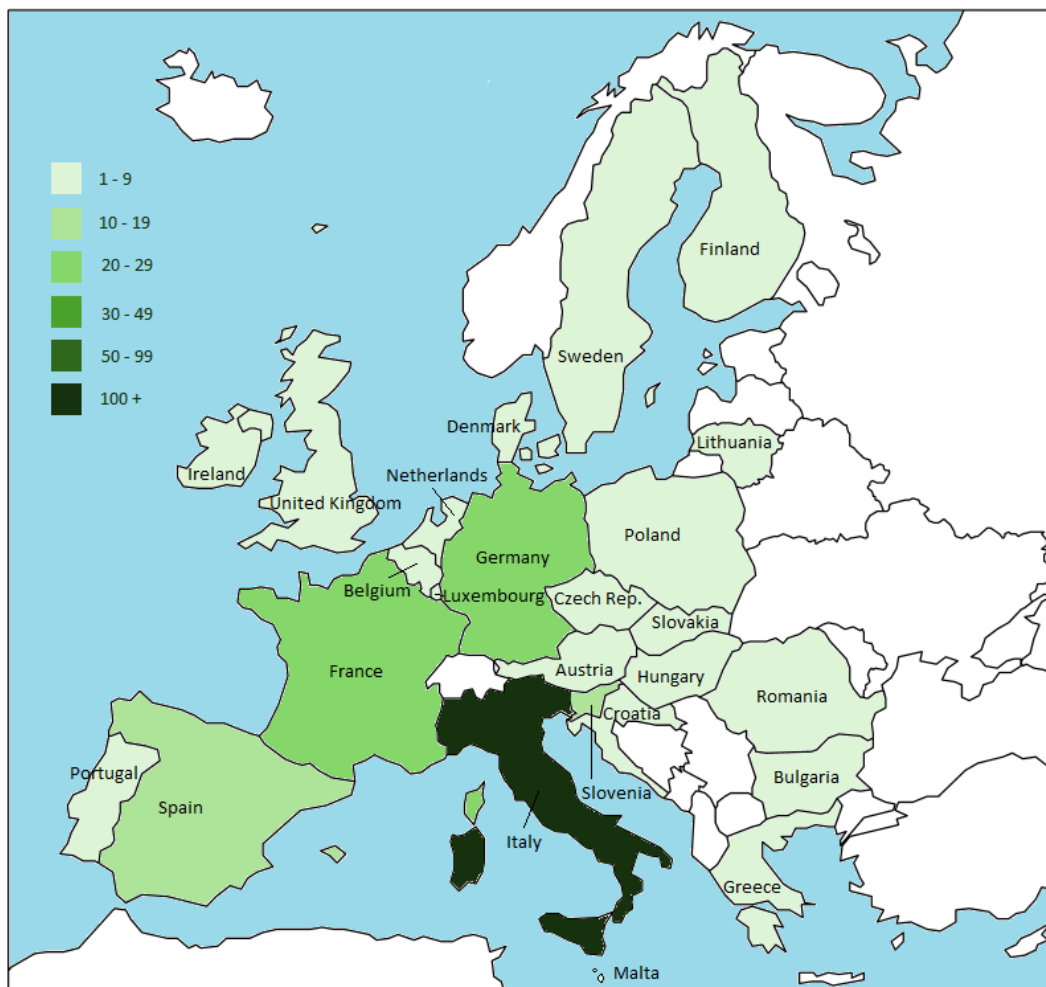


Figure 24: Geographic coverage of scrap industry survey participants (184 respondents)

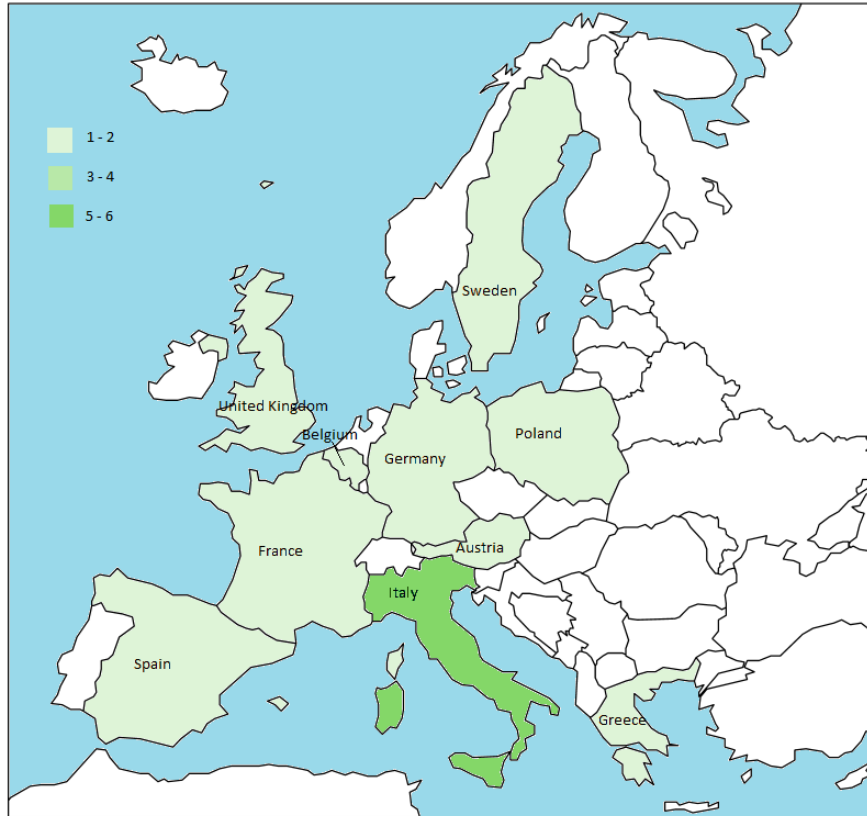


Figure 25: Geographic coverage of steel industry survey participants (8 respondents)

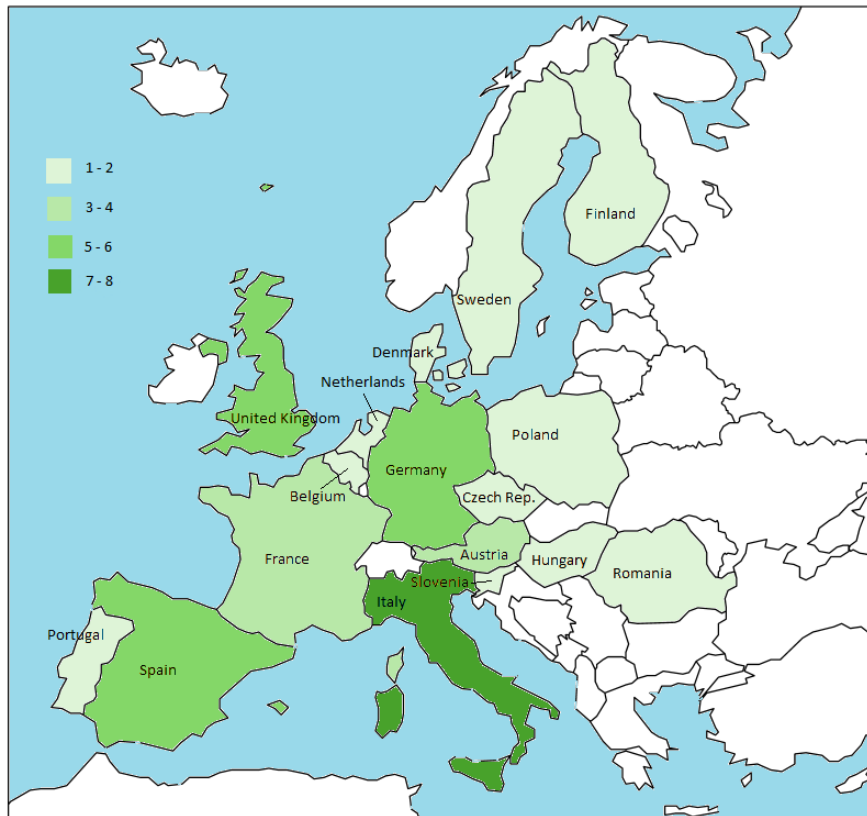


Figure 26: Geographic coverage of aluminium industry survey participants (12 respondents)

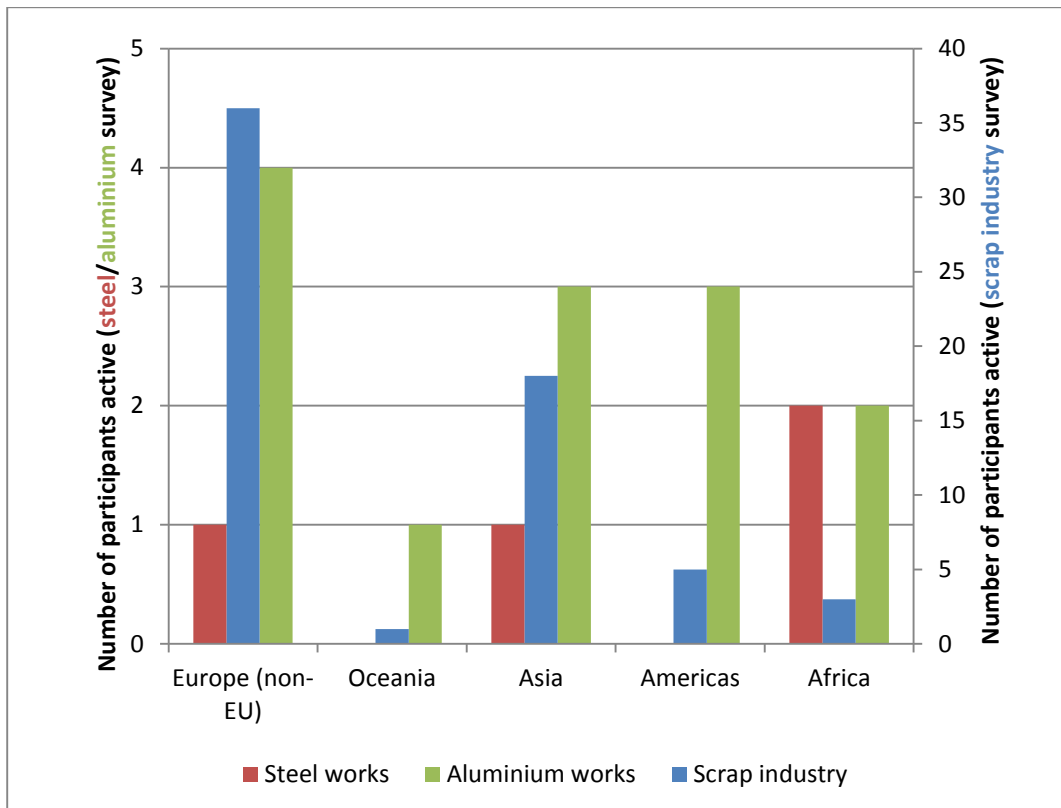


Figure 27: Non-EU coverage of survey participants (steel, 2 respondents; aluminium, 5 respondents; scrap, 42 respondents)

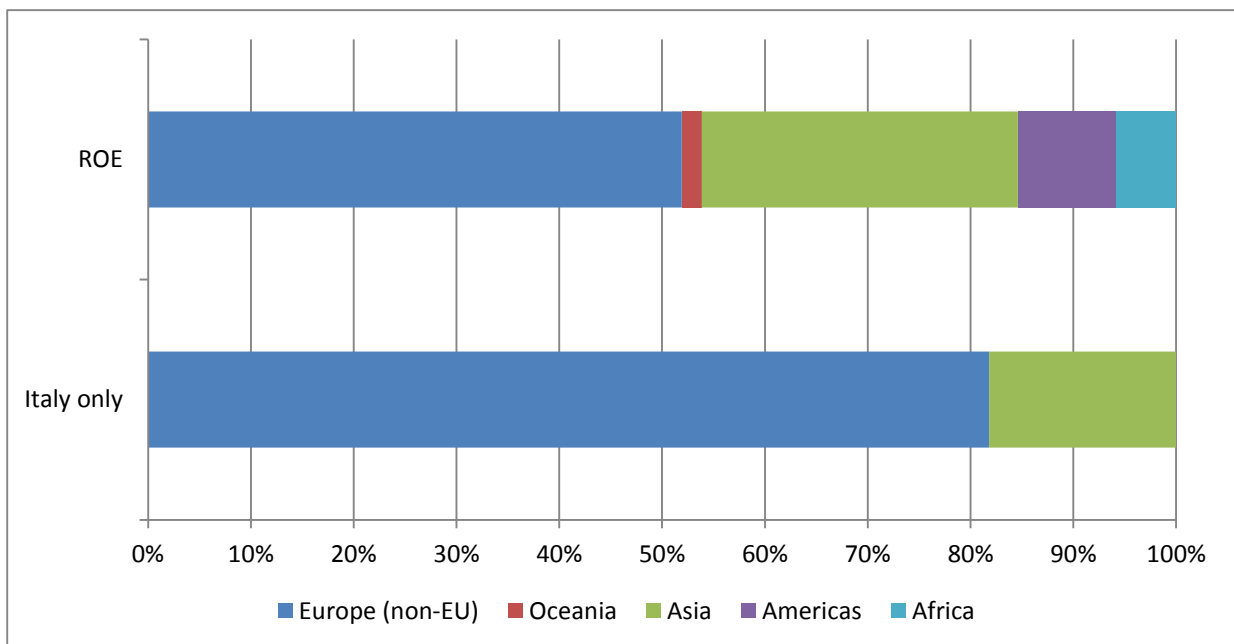


Figure 28: Breakdown of non-EU export destinations for scrap industry survey participants (11 respondents for Italy only, 52 respondents for ROE)

Scrap companies solely operating in Italy are much less likely to export scrap to non-EU regions than companies operating in the rest of Europe: only 8 % of Italian survey respondents reported exporting scrap to non-EU regions compared to 56 % of respondents operating in countries in the rest of Europe (Figure 36). Of the 8% of Italian survey respondents, 82% only export to non-EU countries in Europe, as shown in Figure 28. In contrast, of the 56% of companies operating in the rest of Europe who export

scrap to non-EU regions, nearly half export scrap outside of Europe, including to Oceania, the Americas and Africa.

Most survey participants were aware of Regulation 333/2011, as shown in Figure 29.

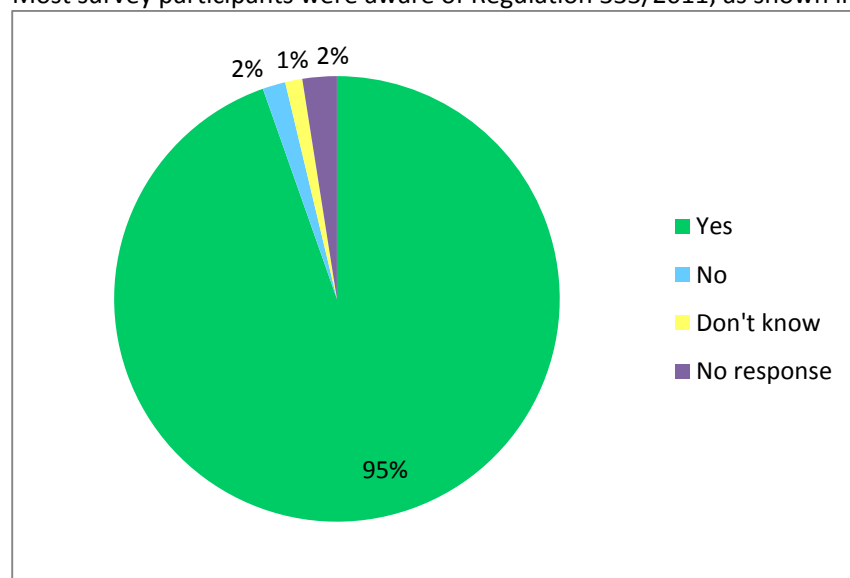


Figure 29: Are you aware of Regulation 333/2011? (241 respondents)

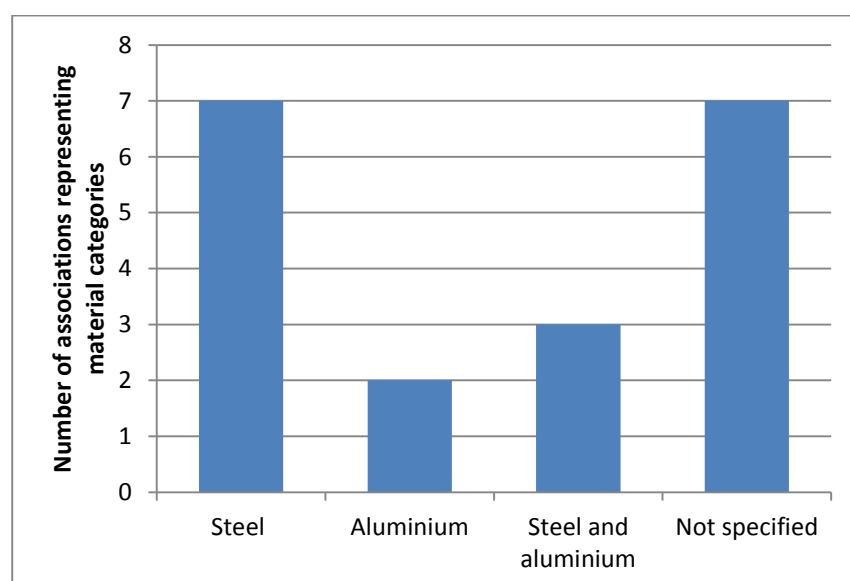


Figure 30: Material represented by industry associations (19 respondents)

From the industry associations, more responses were received representing steel than representing aluminium, as is shown in Figure 30. However, it was not possible to identify the material represented by 7 of the 19 responses.

Many respondents from the scrap industry are involved in more than one activity (e.g. collection, sorting, dismantling, shredding). Of the 173 respondents who answered the question, 478 activities were reported, as shown in Figure 31. Most respondents were involved in scrap collection and sorting, with just under half involved in dismantling and about a third involved in shredding.

Six out of eight respondents from the steel industry reported the activities they are involved in. As shown in Figure 32, three run electric arc furnaces, while two operate basic oxygen furnaces. 11 out of the 14

respondents from the aluminium industry reported the activities they are involved in; as Figure 33 shows, remelting and refining activities are the most prevalent.

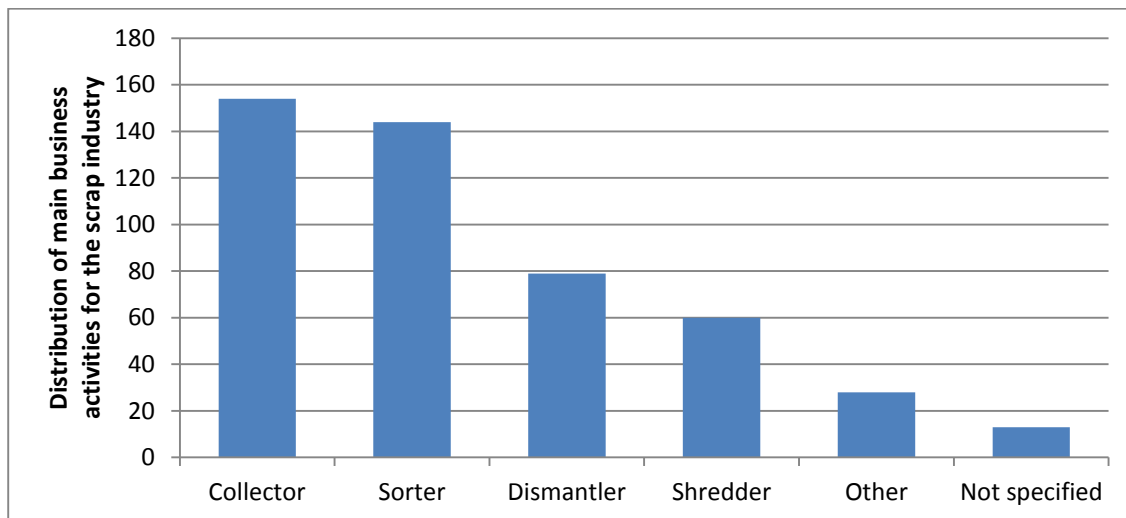


Figure 31: Activities undertaken by respondents from the scrap industry (173 respondents)

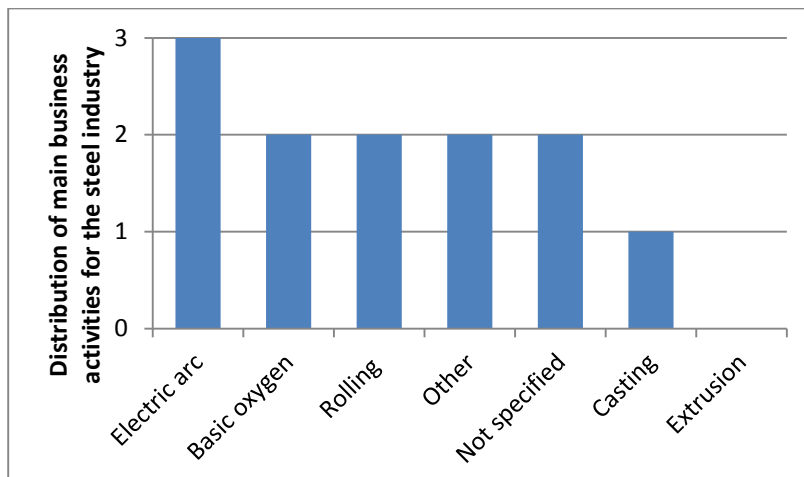


Figure 32: Activities undertaken by respondents from the steel industry (6 respondents)

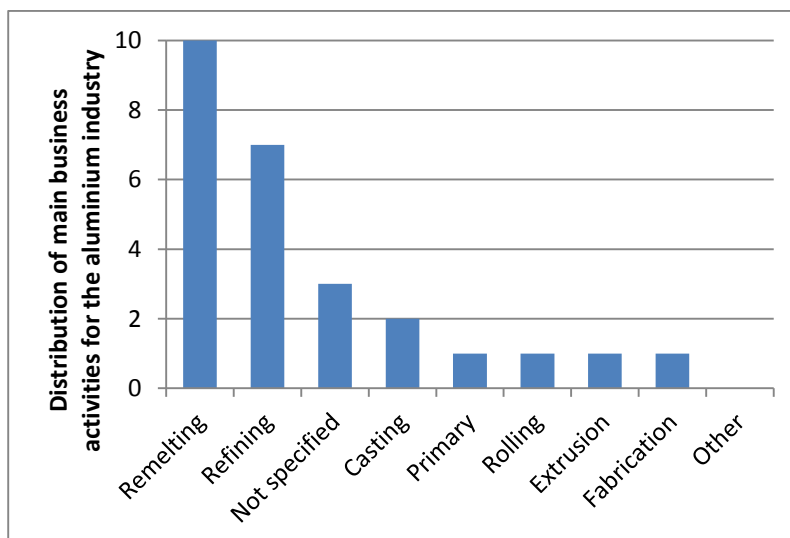


Figure 33: Activities undertaken by respondents from the aluminium industry (11 respondents)

4.2 Uptake of end-of-waste criteria

4.2.1 Scrap generation and export – scrap industry profile

This section of the report explores the responses from the 186 respondents representing the scrap industry. Of the 186 respondents, 172 confirmed that they were involved in generating or selling metal scrap (Figure 34). Of these 172 organisations, most dealt with both iron/steel and aluminium scrap, with only 11 organisations involved with only one of the metal types.

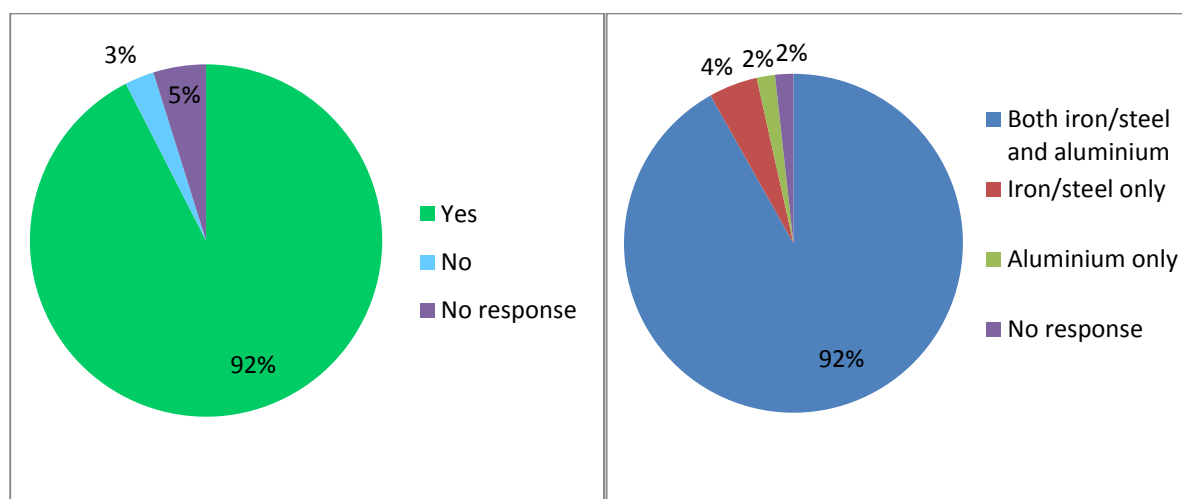


Figure 34:

Left: Proportion of scrap industry participants generating or selling metal scrap (186 respondents)

Right: Metal scrap types generated or sold by scrap industry respondents (172 respondents)

Most of the scrap industry participants reported that they did not export scrap (Figure 35) but other participants reported trade activities both within and beyond the EU. The proportion of participants generating and selling end-of-waste compliant scrap is shown in Figure 37.

Figure 36 shows the breakdown of export destination of iron/steel and aluminium scrap for scrap companies operating solely in Italy, and those operating in at least one other Member State. Companies operating solely in Italy predominantly responded that they did not export scrap, implying that the majority of the scrap remains in Italy. In contrast, companies operating in at least one other Member State predominantly responded that they export scrap either within or beyond the EU.

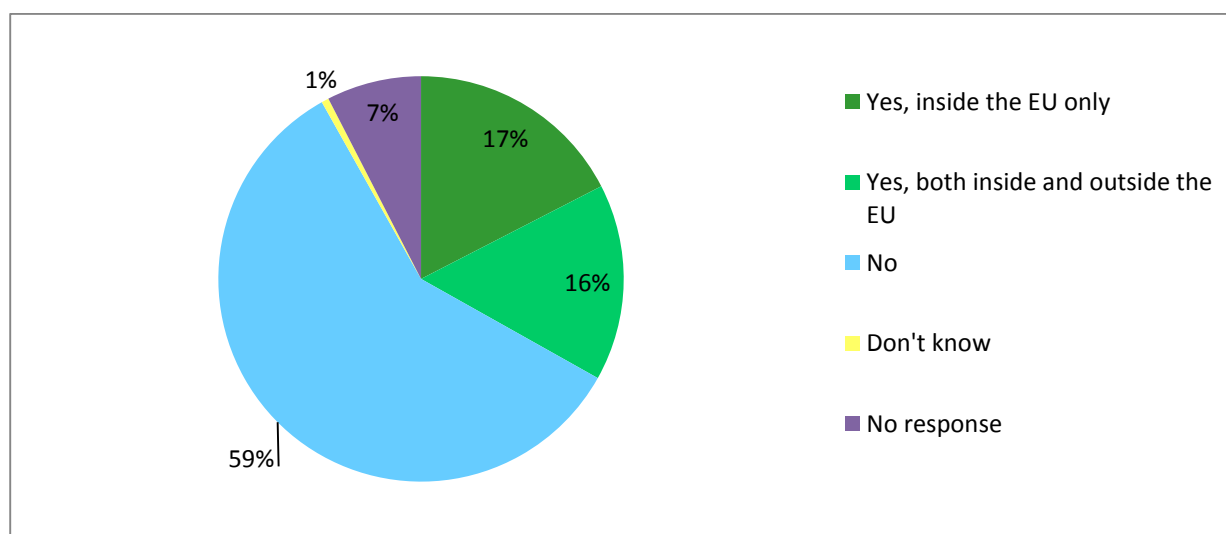


Figure 35: Proportion of respondents exporting iron/steel or aluminium scrap (172 respondents)

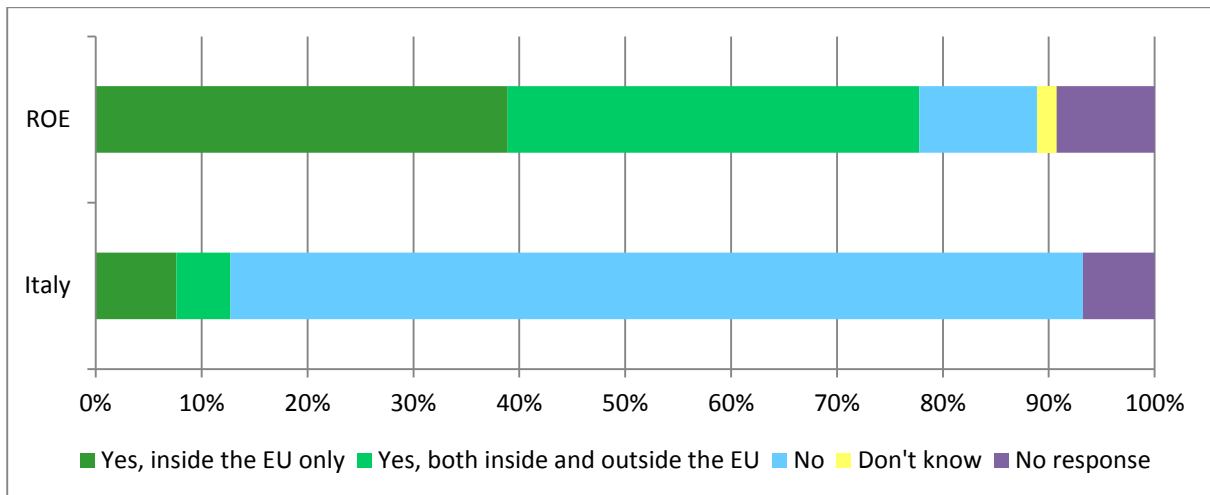


Figure 36: Breakdown of export destination of iron/steel and aluminium scrap (118 respondents for Italy only, 54 respondents for ROE)

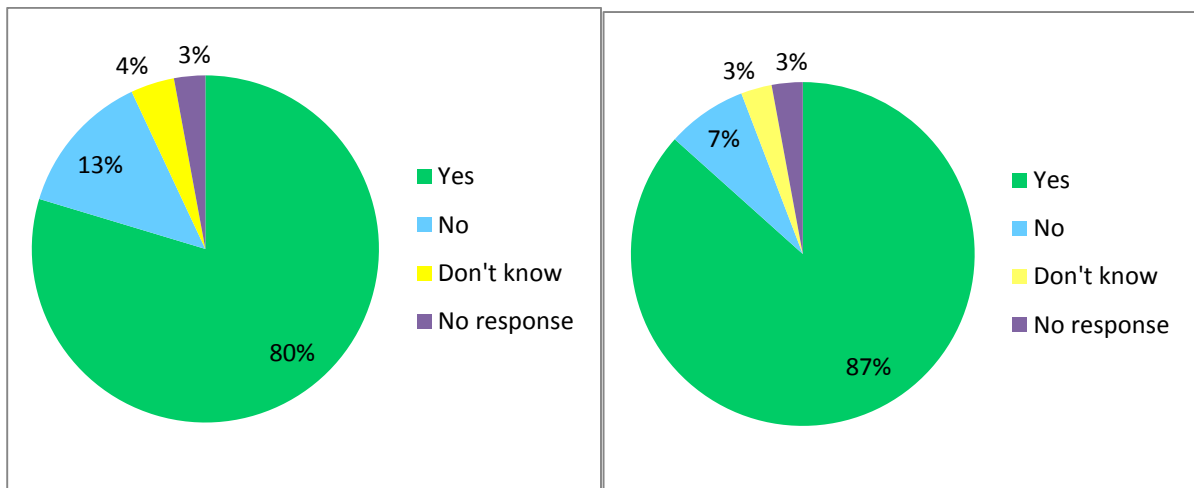


Figure 37: Proportion of participants who generate (left) and sell (right) end-of-waste compliant scrap (172 respondents)

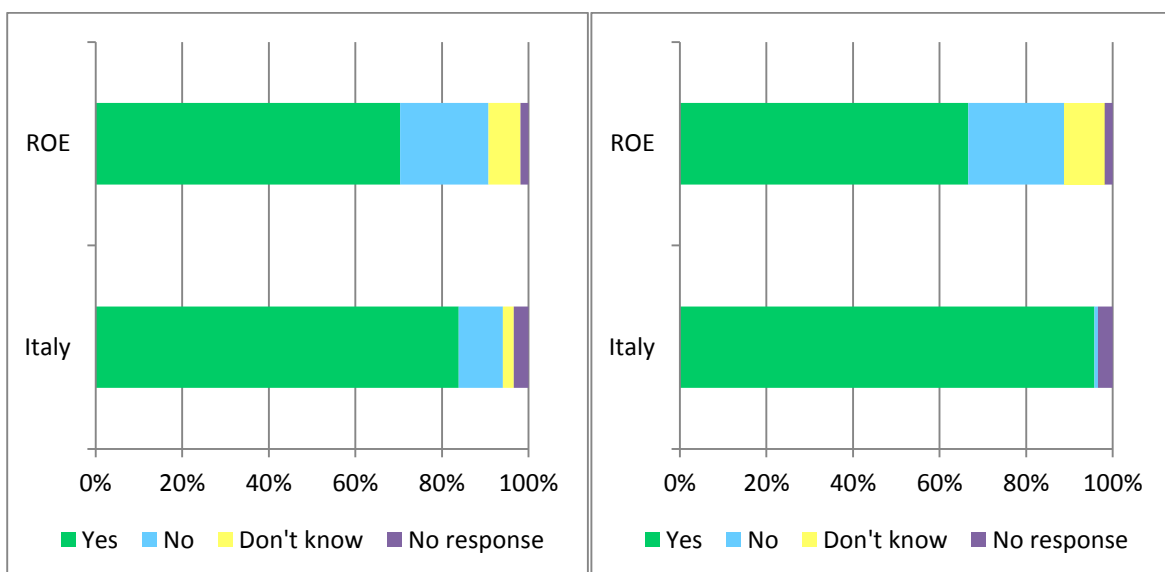


Figure 38: Breakdown of participants who generate (left) and sell (right) end-of-waste compliant scrap (118 respondents for Italy only, 54 respondents for ROE)

Of the 137 participants who reported that they generate end-of-waste compliant scrap, 99 operate solely in Italy (Figure 37) and, of the 149 participants who reported that they sell end-of-waste compliant scrap, 113 operate solely in Italy (Figure 38).

Over three-quarters of the 155 respondents who either generate or sell end-of-waste compliant scrap reported that their quality management system (QMS) was certified by a third-party body prior to achieving compliance, as shown in Figure 39. Figure 39 also shows that only about a third of end-of-waste compliant scrap industry respondents are certified to ISO 9001.

Figure 40 shows that a lower proportion of companies producing end-of-waste compliant scrap and operating solely in Italy are certified to ISO 9001 than those operating in the rest of Europe.

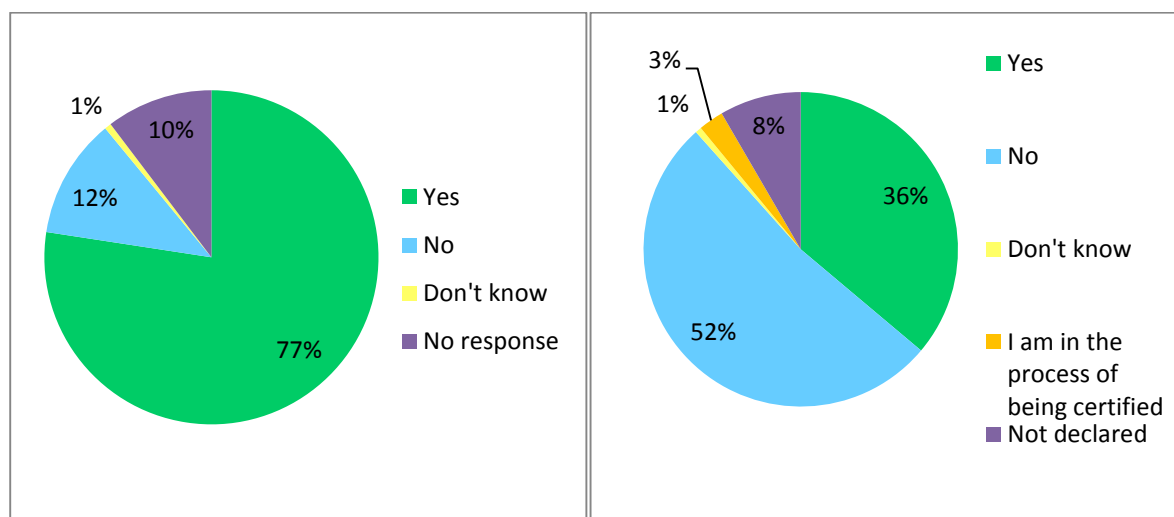


Figure 39:

Left: Was your QMS certified by a third-party body before you became compliant? (155 respondents)

Right: Are EoW compliant scrap industry respondents certified to ISO 9001? (155 respondents)

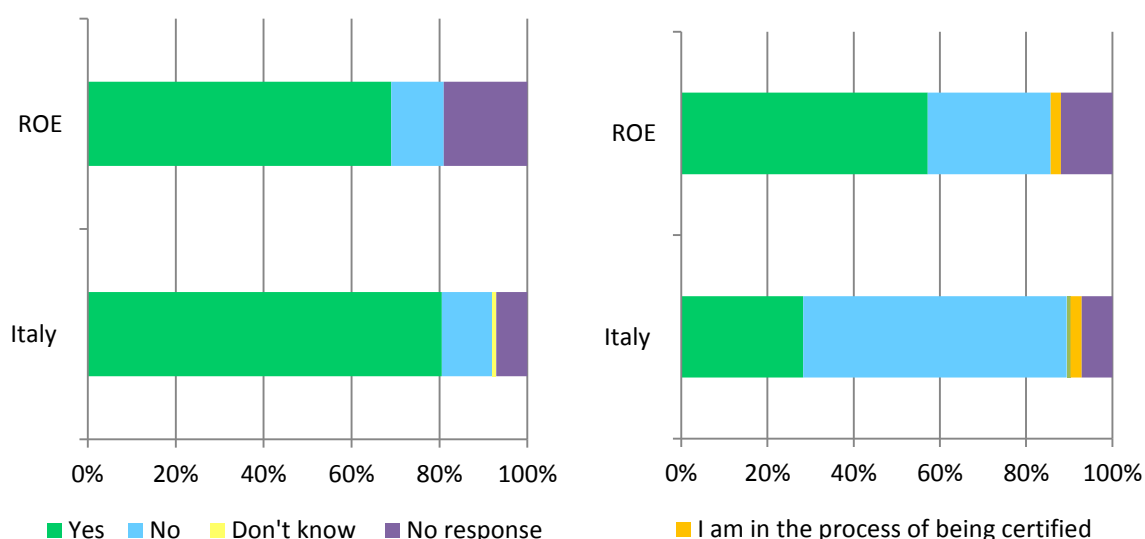


Figure 40: Breakdown of participant responses to the questions: Was your QMS certified by a third-party body before you became compliant? (Left) and Are end-of-waste compliant scrap industry respondents certified to ISO 9001? (Right) (113 responses from Italy only, 42 from ROE)

4.2.2 Scrap industry use of end-of-waste – totals

135 respondents provided information on the date that they became end-of-waste compliant. The first reported uptake from the survey participants was in March 2011. Figure 41 shows the uptake of end-of-waste compliance. A significant increase in uptake is observed in September and October 2011, when 102 companies achieved end-of-waste compliance.

All but one company that achieved end-of-waste compliance in September and October 2011 (the month when the end-of-waste certain came into force in the EU) operate in Italy. 81 of these companies operate in Italy alone. This strong regional influence of uptake is illustrated in Figure 42 and shows that Italian scrap firms are responsible for most of the uptake of end-of-waste compliance reported by the survey respondents. The first scrap organisation to achieve compliance that does not operate in Italy was a German scrap company that became compliant in September 2011, and the second did not become compliant until November 2012.

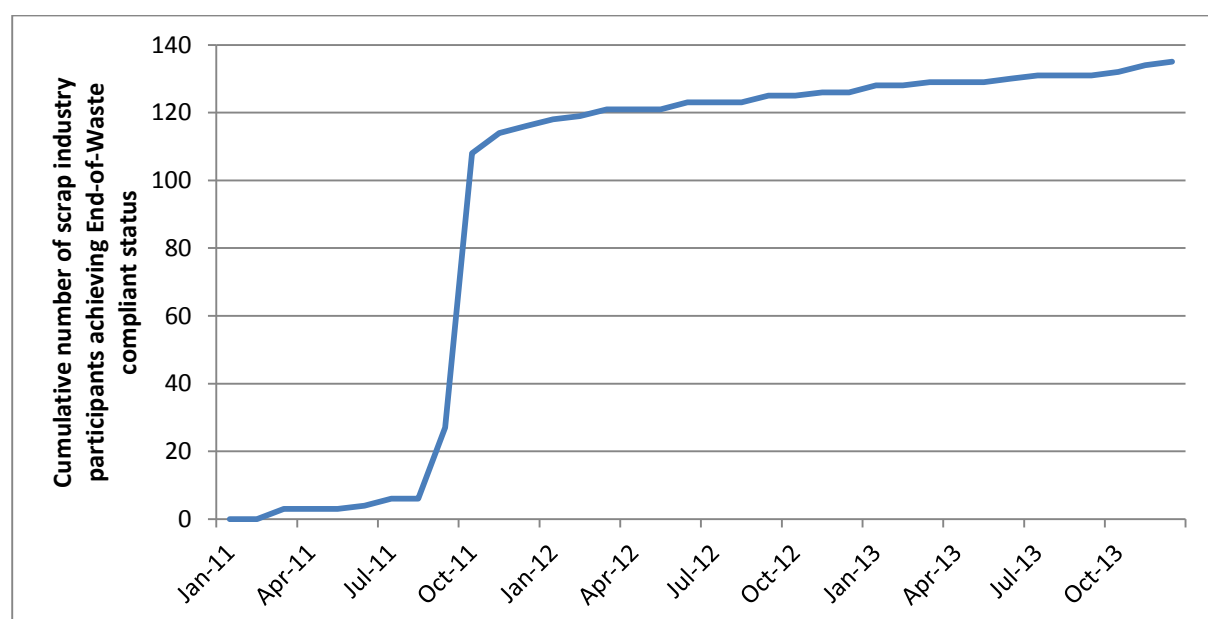


Figure 41: Uptake of end-of-waste criteria by month (135 respondents)

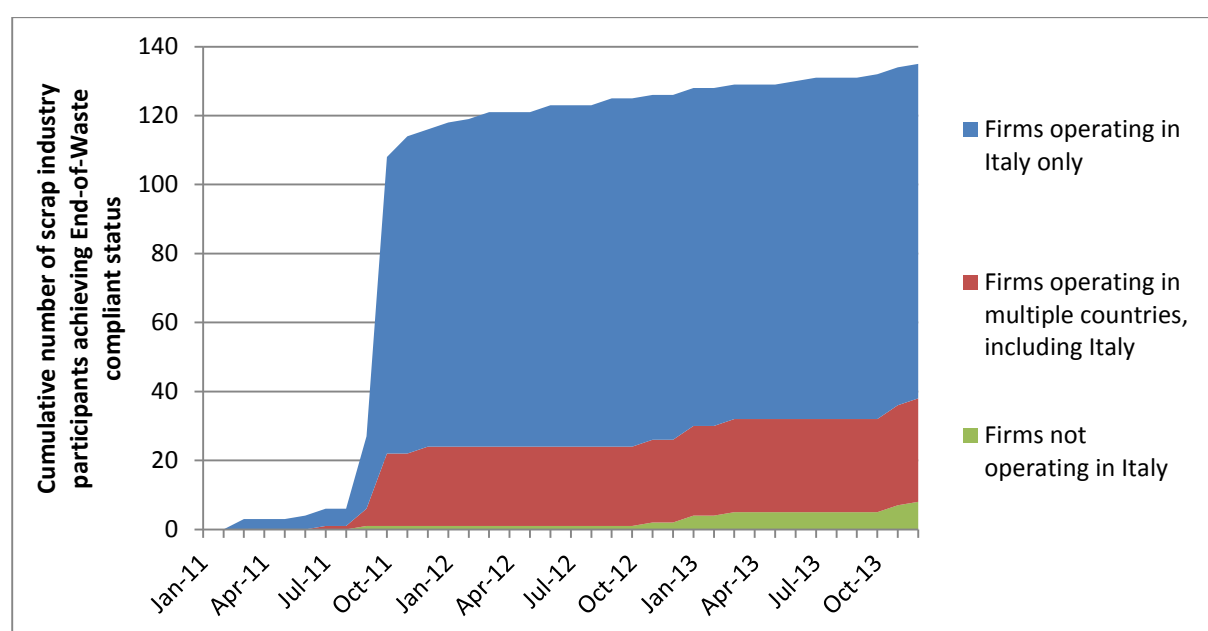


Figure 42: Uptake of end-of-waste criteria by month and region of operation (135 respondents)

Case Study: Why has the uptake of end-of-waste been so fast in Italy?

One striking finding of this study has been the rapid uptake by Italian scrap companies of the end-of-waste criteria for metal scrap. This case study examines the legal situation operating in Italy compared to other EU Member States, to see whether greater uptake of the end-of-waste criteria for metals might be expected beyond Italy in the near future.

Italian legal framework

Part of the rapid uptake of end-of-waste criteria in Italy relates to specific legal peculiarities that were not present outside of the Italian context relating to 'Secondary raw materials'. Secondary raw materials were defined for the first time in Italy in 1988, and the concept was finally and unambiguously enshrined in law through Decree 4/2008. This meant that "wastes, following a recovery operation, and if compliant to certain criteria, could be used as raw materials in production processes".

The latest EU Waste Framework Directive (2008/98/EC) also started to set out conditions for establishing criteria by which certain types of waste may cease to be considered as such. For scrap metals, in particular, Council Regulation 333/2011 came into force on 9 October 2011, thereby establishing end-of-waste criteria for scrap metals.

As such, the introduction of Regulation 333/2011 for end-of-waste criteria for scrap metals in many ways essentially superseded existing Italian laws on secondary raw materials. Some new conditions were attached to the new Regulation; in particular, mandating that scrap companies needed to have a certified QMS, although some companies already had these in place. However, EU criteria relating to maximum contamination were actually less stringent than the existing Italian laws. It is therefore clear that significant experience in operating with 'end-of-waste' regulations already existed in Italy, even before the more recent EU regulations came into force in 2011.

In addition, part of the attractiveness of operating to the end-of-waste criteria in Italy relates to the possibility for companies using end-of-waste scrap to entirely escape the demanding stipulations of all the waste regulations. In some locations in Italy, it can be very challenging to receive the necessary waste permits to operate, such that many companies choose to operate purely under the end-of-waste legislative framework.

Propagation beyond Italy

Discussions held at the study expert workshop examined the reasons why the uptake of end-of-waste had been so slow outside of Italy. These comments were all made to explain the slow uptake to date:

- The length of time that it takes to embed a QMS into a company, which can take up to a whole year. It could then be expected to take a further year to embed end-of-waste into a company.
- Challenges in establishing an accreditation body able to certify companies against end-of-waste.
- Demands for a particular QMS to be used, e.g. ISO 9001 in France (recently rejected in court).
- Loss of subsidies or tax rebates for recycling to scrap processors or metal works, e.g. Hungary and Luxembourg.
- Blockages of cross-border end-of-waste shipments by ill-informed customs services.

However, interest in end-of-waste in other EU Member States beyond Italy does appear to be growing. For example, stakeholders mentioned that in the Netherlands a system similar to that in Italy may be introduced by the authorities in consultation with the national scrap metal industry association MRF.

In addition, some of these challenges now seem to have been resolved, so greater levels of uptake for end-of-waste might soon be expected in other Member States including, UK, France and Germany.

Sources: Information summarised from industry, authorities and association survey submissions; as well as other sources. See in particular the useful article by the International Law Office (Feb 2009), New Decree Clarifies Law on Secondary Raw Materials and By-products.

Figure 43 shows that most respondents who sell end-of-waste compliant scrap do not export the scrap: 81 % of participants either do not export scrap or export scrap inside the EU only. This suggests that high quality end-of-waste compliant scrap is not being widely exported to outside the EU.

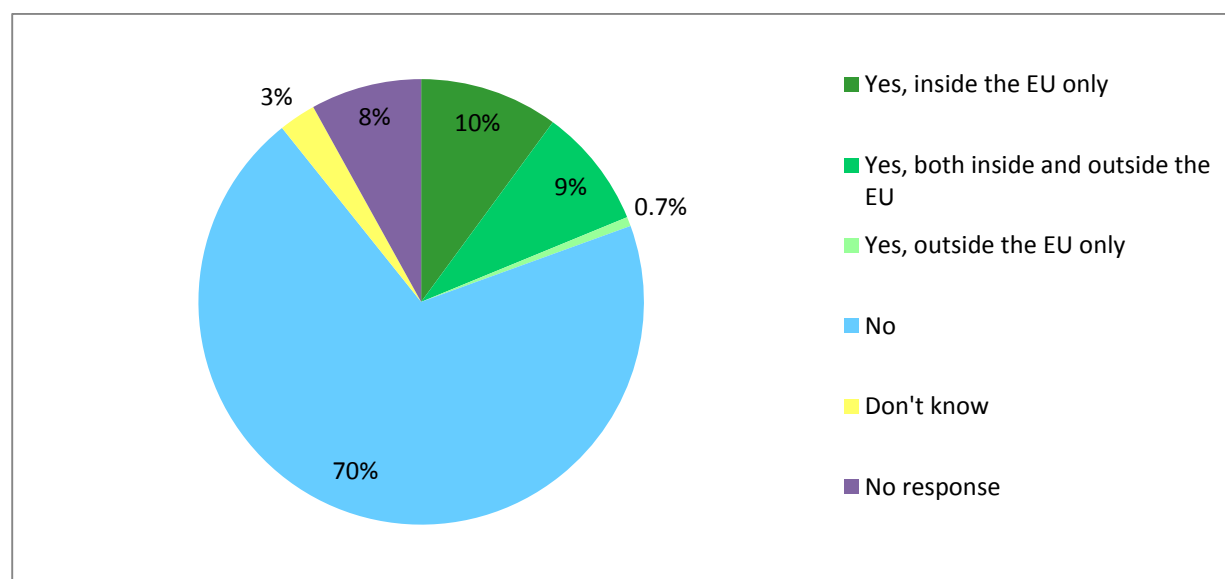


Figure 43: Proportion of participants who sell end-of-waste compliant scrap who export scrap (149 respondents)

As for the export of all scrap (Figure 44), few scrap companies operating solely in Italy export end-of-waste compliant scrap compared to the 50 % of respondents operating in at least one other Member State, who export end-of-waste compliant scrap inside or beyond the EU.

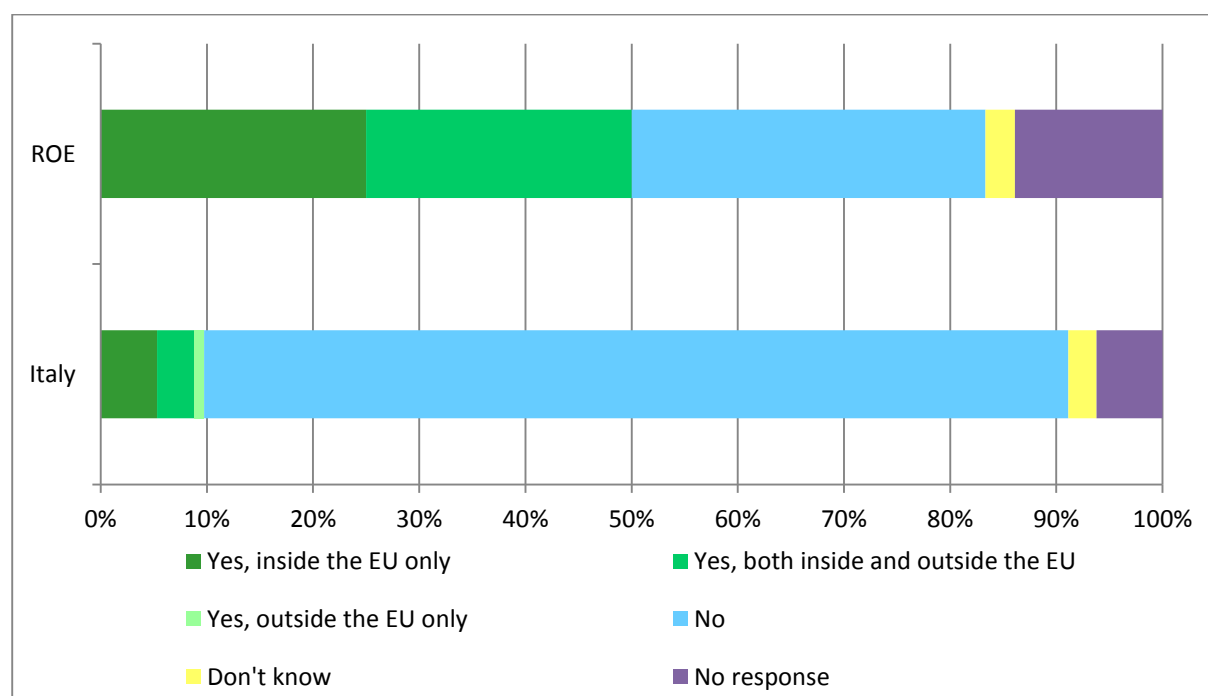


Figure 44: Breakdown of export location for end-of-waste compliant scrap (113 respondents for Italy only, 36 respondents for ROE)

4.2.3 Scrap industry use of end-of-waste – by grade

Table 5 and Table 6 show the approximate EU scrap mix and price for steel and aluminium scrap by grade. For steel, old scrap is the largest grade by volume and the highest price grades are stainless scrap, shredded scrap and new production scrap. For aluminium, there is a more even distribution of scrap grades with no single grade making up more than 20% of the scrap mix. The highest process aluminium grades are clean extrusion scrap, lithographic sheets, aluminium cuttings and painted/insulated extrusion scrap.

Table 5: Steel scrap generation and prices by grade

Steel Grade	Approximate Scrap Mix (%)	Average Price, 2013 (€/tonne)
Old steel scrap (thick)	50%	€ 250
Old steel scrap (thin)		€ 230
New production scrap	15%	€ 260
High residual scrap	-	-
Shredded	25%	€ 275
Steel turnings	5%	€ 160
Fragmentised	-	-
Stainless scrap	5%	€ 1,050

Sources: EFR Survey Response, Metal Bulletin for price data

Table 6: Aluminium scrap generation and prices by grade

Aluminium Grade	Approximate Scrap Mix (%)	Average Price, 2013 (€/tonne)
Aluminium cuttings	20%	€ 1,230
Old rolled aluminium	10%	€ 1,110
Clean cast aluminium	10%	€ 1,180
Post-consumer cast scrap	10%	
Clean extrusion scrap	20%	€ 1,330
Painted/insulated extrusion scrap	15%	€ 1,230
Aluminium turnings	10%	€ 900
Aluminium foil	1%	€ 350
Lithographic sheets	1%	€ 1,330
Wire and cable scrap	2%	-
Used beverage cans	1%	€ 1,070

Sources: Eurometrec Survey Response; Metal Bulletin, LetsRecycle, MRW for price data

Figure 45 shows the number of scrap industry respondents that produce end-of-waste compliant iron/steel scrap by grade. The graph shows that there is a wide range of iron/steel scrap that is end-of-waste compliant, with the exception of high residual scrap. Perhaps as expected, uptake is greatest for grades with the highest volumes (e.g. old scrap) and highest price (e.g. stainless, shredded and new production scrap). The 'other' category listed four grades: metal sheets (Lamierino CECA 50), demolition scrap, ferrous and non-ferrous scrap, and Proler CECA 33. Preliminary estimates of the relative uptake by grade can be found in Figure 56, which takes account of the relative importance of each grade.

Figure 46 shows that the grades of end-of-waste scrap produced do not vary greatly between companies operating solely in Italy and those operating in at least one other Member State, i.e. there is no regional variation in the end-of-waste grades produced.

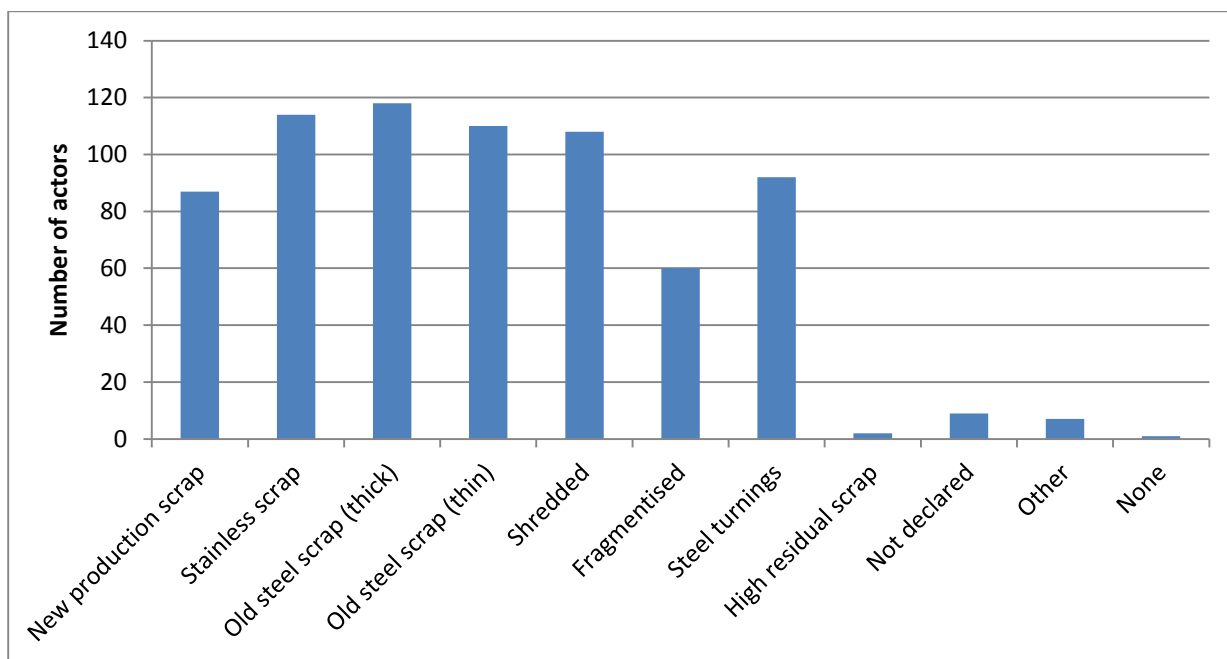


Figure 45: Number of actors active in producing end-of-waste compliant iron/steel scrap by grade (146 respondents, 9 not declared)

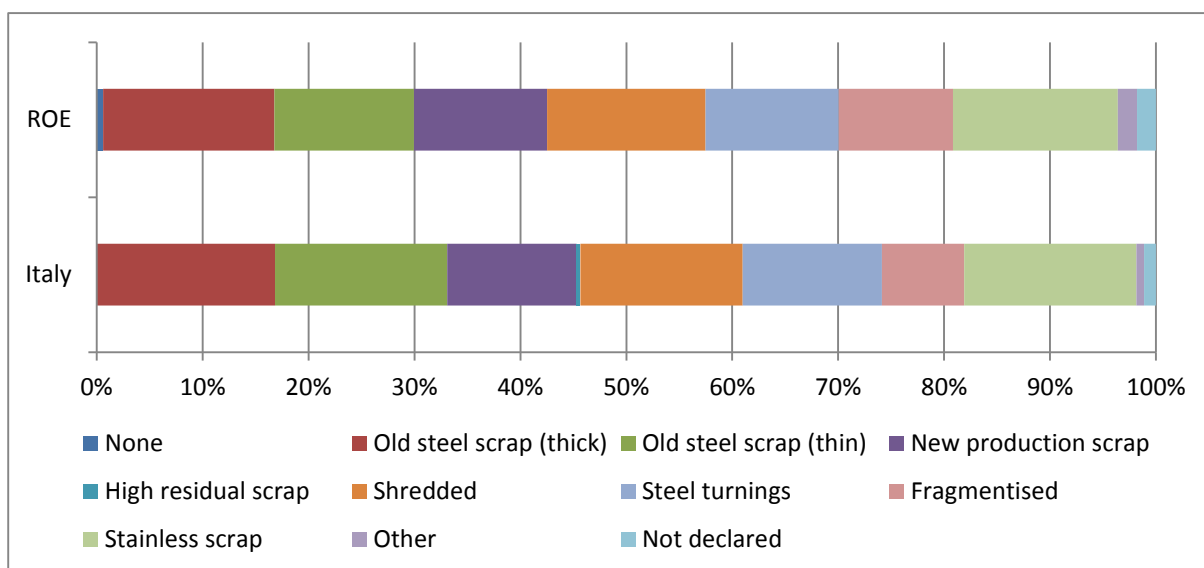


Figure 46: Breakdown of iron/steel end-of-scrap grade for scrap companies operation solely in Italy and those operating in at least one other Member State (107 respondents for Italy only, 39 respondents for ROE)

Figure 47 shows the number of scrap industry respondents that produce end-of-waste compliant aluminium scrap by grade. As for iron/steel scrap, there is a wide range of scrap grades that are end-of-waste compliant, with the exception of aluminium foil. There are higher numbers of actors in the high volume, high price grades (e.g. clean extrusion scrap), and fewer actors in the low volume grades (e.g. aluminium foil, used beverage cans and wire and cable scrap). Two respondents reported producing end-of-waste compliant scrap in the 'other' category: Zorba, or fragmentised aluminium and new aluminium bar scrap. Preliminary estimates of the relative uptake by grade can be found in Figure 57, which takes account of the relative importance of each grade.

As with the iron/steel grades, there is not a large variation in the aluminium end-of-waste grades produced by scrap companies operating solely in Italy and those operating in at least one other Member

State. The most marked differences are the greater proportions of painted/insulated extrusion scrap and aluminium turnings, and the reduced proportions of lithographic sheets, produced by companies operating solely in Italy.

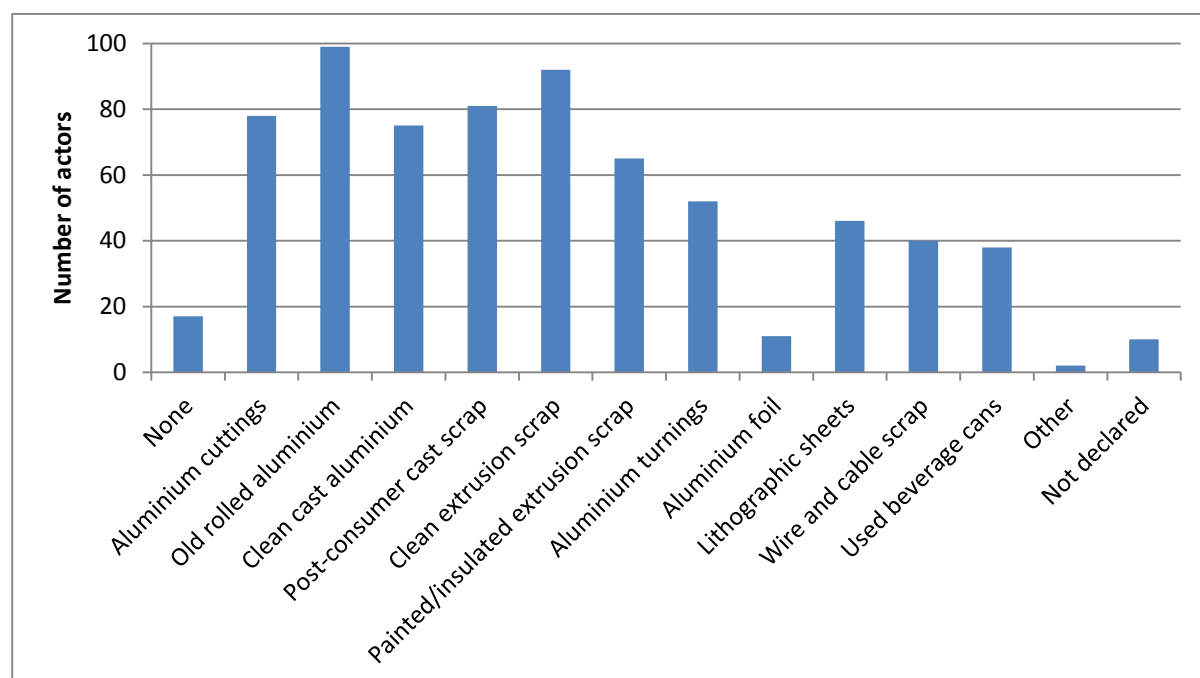


Figure 47: Number of actors active in producing end-of-waste compliant aluminium scrap by grade (145 respondents, 10 not declared)

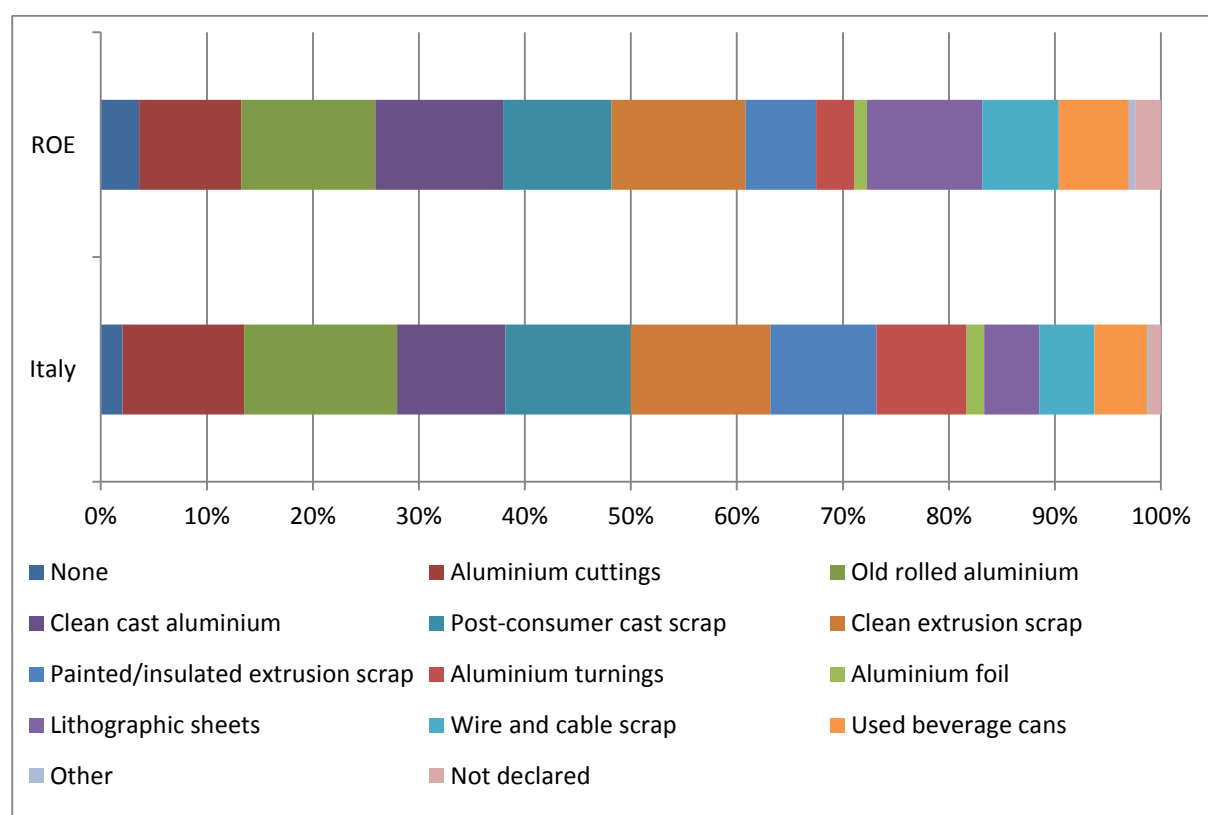


Figure 48: Breakdown of aluminium end-of-scrap grade for scrap companies operating solely in Italy and those operating in at least one other Member State (111 respondents for Italy only, 44 respondents for ROE)

4.2.4 Scrap industry quantitative sales data

Figure 49 shows the annual iron and steel scrap tonnages sold inside the EU or exported disclosed by scrap industry respondents. Between 80 and 90 respondents provided tonnage data for each year. The graph distinguishes between firms that operate solely in Italy and those firms that operate in at least one other Member State. The highest proportion of the respondents report annual sales/exports of less than 10,000 tonnes with the fewest respondents in the 100,000-200,000 tonnes category, although there are quite a number of companies who operate in the 10,000-19,000 tonnes or 20,000-49,000 tonnes bands.

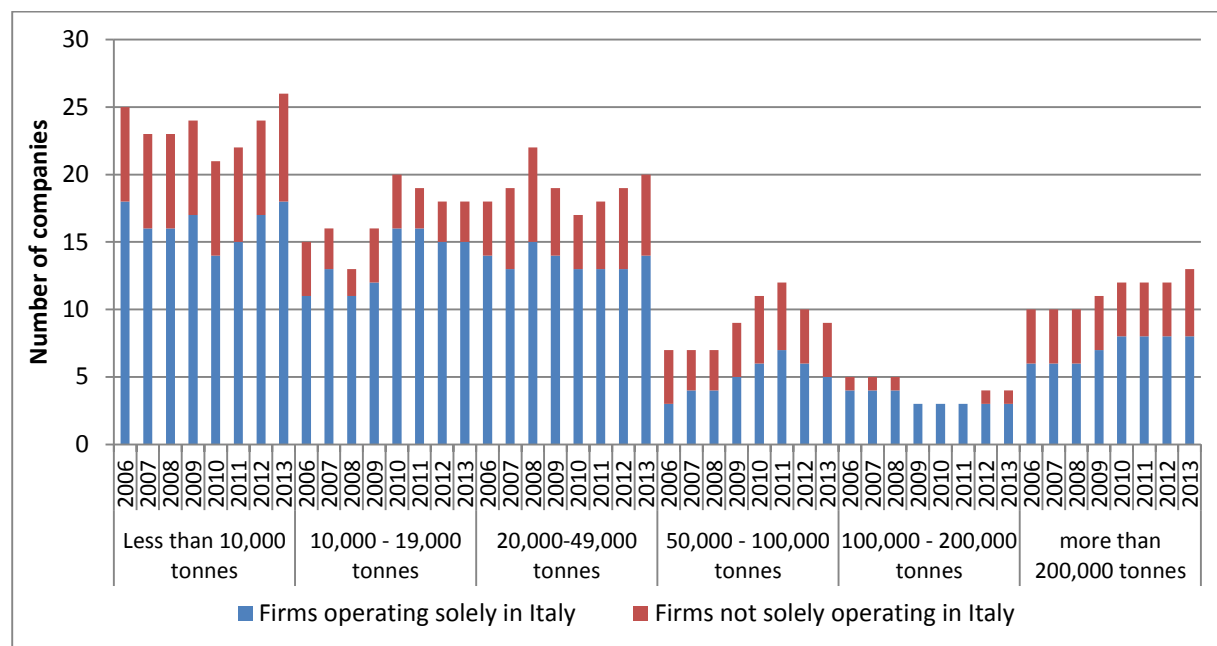


Figure 49: Breakdown of annual iron/steel scrap sales volume for those survey participants which provided quantitative data submissions, differentiating between firms operating solely in Italy and firms operating in at least one other Member State (number of respondents varies from 80 to 90 for each year)

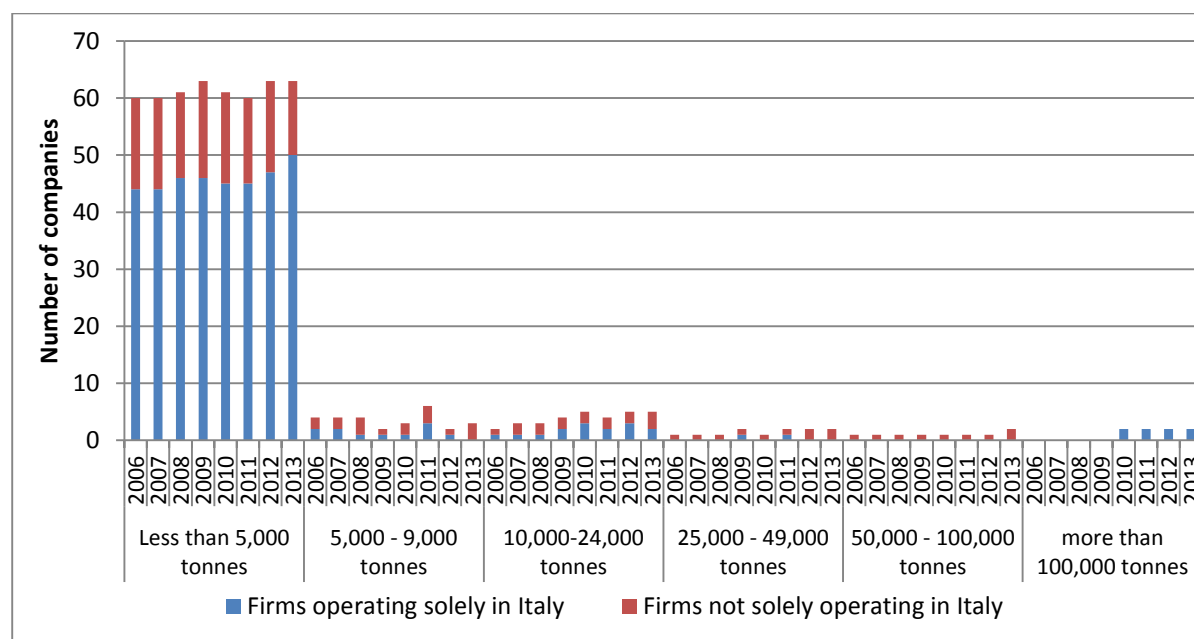


Figure 50: Breakdown of annual aluminium scrap sales volume for those survey participants which provided quantitative data submissions, differentiating between firms operating solely in Italy and firms operating in at least one other Member State (number of respondents varies from 68 to 77 for each year)

A similar analysis of the annual aluminium scrap tonnages sold or exported disclosed by scrap industry respondents is shown in Figure 50. Between 68 and 77 respondents provided tonnage data for each year. Again, the graph distinguishes between firms that operate solely in Italy and those firms that operate in at least one other Member State. Most respondents report annual sales/exports of less than 5,000 tonnes. Relatively few companies have aluminium scrap operations exceeding 5,000 tonnes.^a

4.2.5 Motivations and benefits – scrap industry responses

Figure 51 shows the motives that scrap industry respondents had for pursuing end-of-waste compliance. The most cited reason was to gain a competitive edge over other scrap sellers, followed by improving company image and responding to customer demand for compliance. No respondents selected tax reductions or subsidies as a motive for pursuing compliance. Other motives reported by respondents included: legal requirement and adjustments to current legislation, facilitation of medium- to long-term storage at port facilities requiring a permit or license to store material, and that Italian steel and aluminium foundries are not allowed to use scrap metal which is classified as waste.

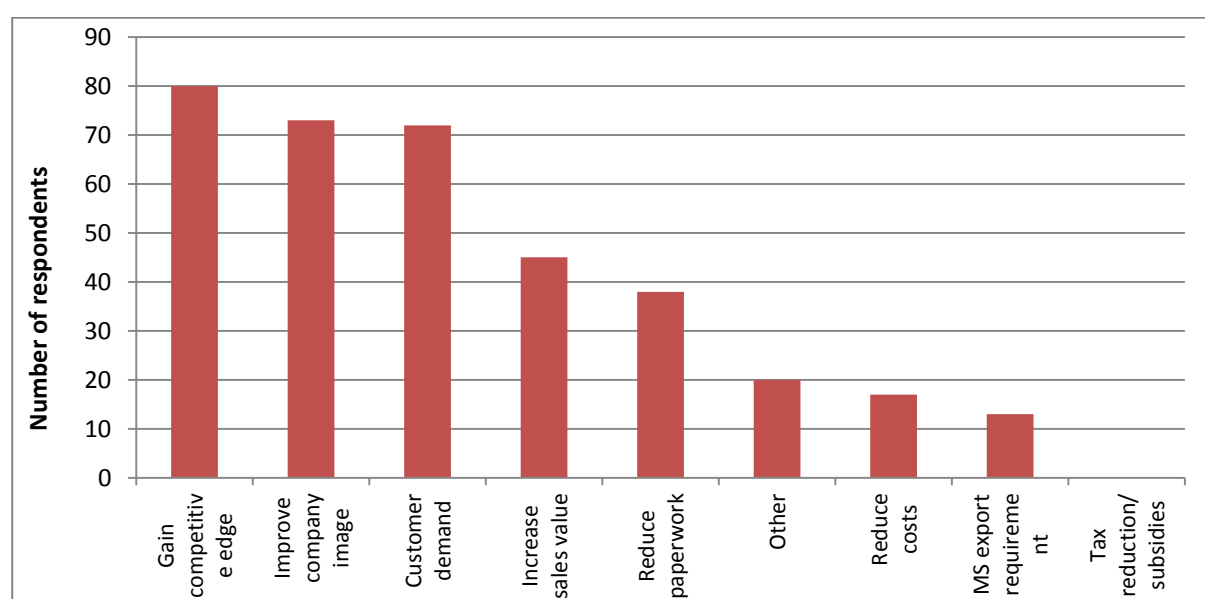


Figure 51: Motivation for organisation to pursue end-of-waste compliance (145 respondents)

Figure 52 shows the benefits scrap industry respondents have seen from achieving end-of-waste compliance. The most widely selected response was that they had not observed any benefits since achieving compliance.

This is perhaps unsurprising given the large number of survey participants from Italy, where a similar legal framework to end-of-waste was already in place and where a consolidation of the benefits by the EU system was thus more likely to be expected than substantial new benefits. Furthermore, if many companies were looking to gain a competitive edge, then introducing end-of-waste simply meant keeping up with the competition.

For those that did observe benefits, these were most likely to be increased customer numbers (23 respondents) and an increase in the sales value of scrap (22 respondents). Scrap industry participants provided several additional comments in response to the question on the benefits seen from achieving end-of-waste compliance. These responses are collated in Table 7.

^a The size bands for aluminium scrap are lower than those for ferrous scrap by a factor of 2, but greater segmentation of the less than 5,000 tonnes category might be useful for any future survey.

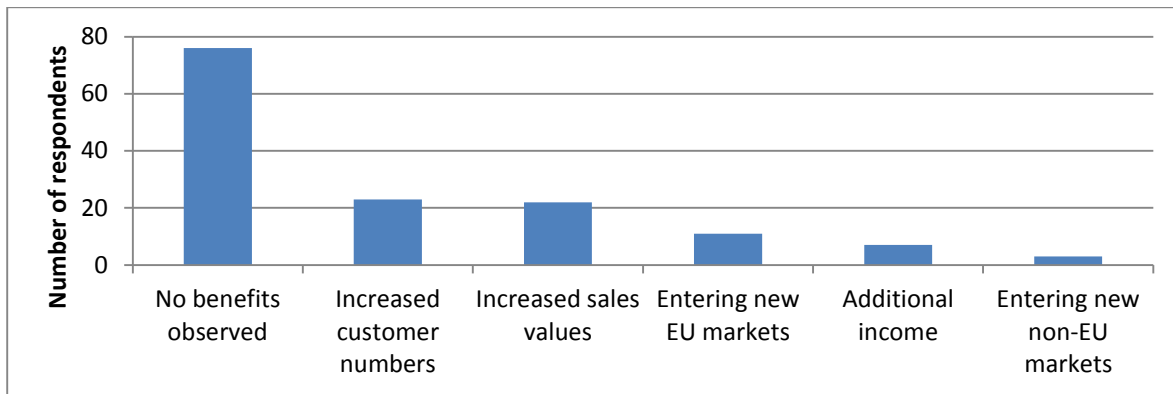


Figure 52: Benefits seen by organisations that have achieved end-of-waste compliance (145 respondents)

Table 7: Other comments relating to benefits seen by organisations achieving end-of-waste compliance

'Other' benefits comments

Management has been simplified compared to existing legislation.
Simplified process.
Simplified consignment system within an absurd legislative situation in Italy.
It is a requirement in order to trade scrap in Italy.
It has allowed us to enter new markets in the EU, the opportunity to insert Eurofer standards and 'standards specific to the client' on top of normal sector standards.
We have obtained a secure legislative source which has allowed us to operate correctly and to demonstrate it to the Competent Authorities.
Increased checks of scrap metals both when received and sold through the quality management system.
We certified the quality of treated scrap metal.
To facilitate medium to long term storage at port facilities with requirement for permit/license.
We have been more competitive than companies that are not compliant.
We have not lost any clients.
Increased visibility/exposure.
A reduction in the amount of paperwork required.
Reduced amounts of paper work and administrative costs.
Reduced frequency and number of lab tests.

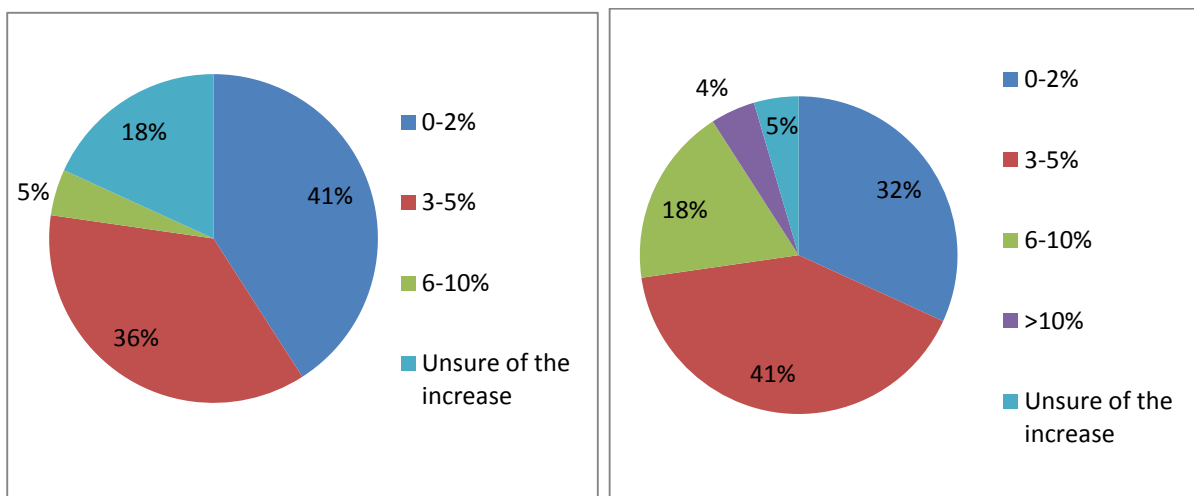


Figure 53: Magnitude of benefit from achieving end-of-waste compliance

Left: Increase in sales value (22 respondents)

Right: Increase in customer numbers (22 respondents)

The magnitude of the benefits of achieving end-of-waste compliance as perceived by the scrap industry participants is shown in Figure 53. For the sales value increase, the mean increase reported was 2.7 %; the modal increase was 0-2 %. For the increase in customer numbers, the mean increase reported was 4 % (assuming >10 % value = 10 %), the median increase was 3-5 % and the modal increase was also 3-5 %.

Of the 29 respondents who did not report they generated or sold end-of-waste compliant scrap, only two provided reasons for not pursuing compliance. Both respondents reported that the costs of compliance are too high, while other issues of a lack of demand for compliant scrap, an inability of their product to meet the criteria, a lack of perceived benefits and legal complications were selected by one respondent.

4.2.6 Estimated end-of-waste sales/exports – scrap industry

The survey participants were then asked to provide quantitative data on sales, exports and end-of-waste within given size bands and using approximate percentages. 90 companies provided at least some of this quantitative data. The data has been aggregated to produce estimates of the total quantity of scrap sales accounted by the survey and therefore its proportion of the overall EU market. These figures also differentiate between scrap firms that operate solely in Italy, and those that operate in at least one other Member State.

Figure 54 shows the quantities of scrap iron/steel sales estimated from the survey (for the companies that provided quantitative data). This amounts to approximately 5 million tonnes per year, which is approximately 4.5 % of all of the ferrous scrap generated within the EU.

The vast majority of this scrap is sold in the EU. The Italian-based companies reported that only 1 % of their scrap sales were to countries outside the EU, the figure for those companies not operating in Italy was nearer 8-10 %. Error bars were calculated using the lower and upper bounds of the tonnage ranges presented in the survey; however, the lower bound for the “Less than 10,000 tonnes” category was taken as 100 tonnes (a lower bound of 0 tonnes was deemed unrealistic) and the upper bound for the “More than 200,000 tonnes” was taken as 300,000 tonnes.

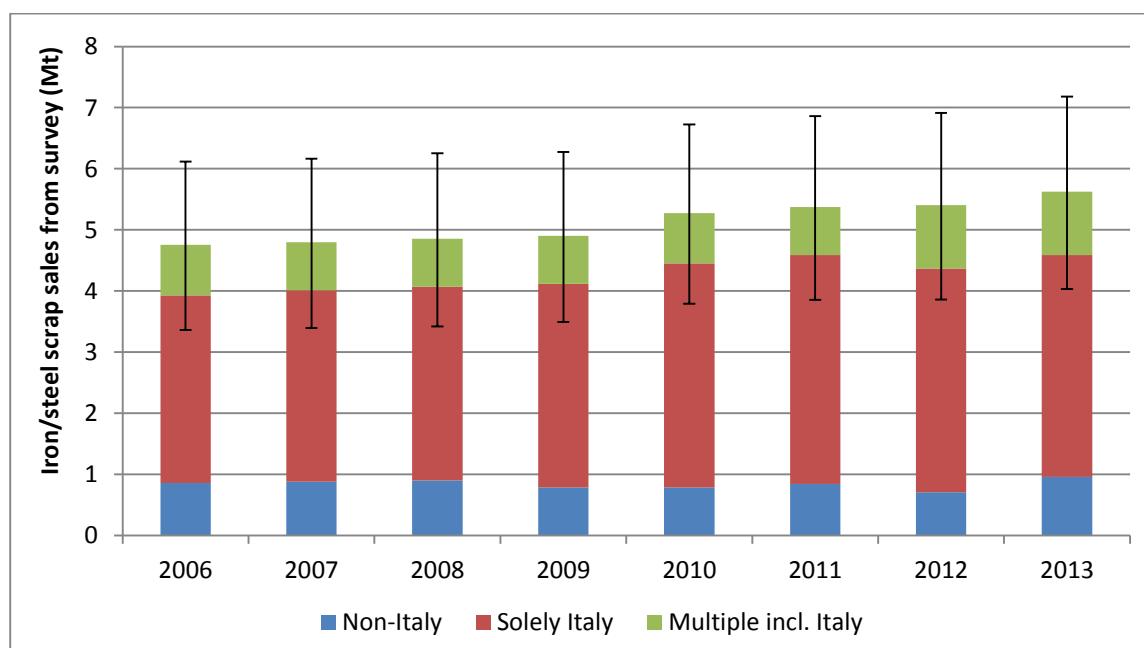


Figure 54: Sales of iron/steel scrap from survey data, differentiating between firms operating solely in Italy and firms that operate in at least one other Member State, millions of tonnes (the number of respondents for each year (2006-2013) were 80, 80, 80, 82, 84, 86, 87 and 90)

Figure 55 shows the quantities for scrap aluminium sales reported by the survey respondents. This amounts to approximately 0.7-0.8 million tonnes per year, which is approximately 15 % of all of aluminium scrap generated within the EU. However, as there were a large number of respondents who reported scrap sales in the “Less than 5,000 tonnes” category, the error bars for total aluminium scrap sales have a large negative tail. Again, the vast majority of this scrap is sold within the EU. The Italian-based companies reported that none of their scrap sales went outside the EU, with a figure nearer 12 % for companies not operating in Italy.

The increase in scrap sales from 2009 to 2010 is primarily due to one respondent reporting a large increase in sales and another respondent with large scrap sales providing tonnage data for 2010 onwards. As for iron/steel scrap, error bars were calculated using the lower and upper bounds of the tonnage ranges presented in the survey; the lower bound for the “Less than 5,000 tonnes” category was taken as 100 tonnes and the upper bound for the “More than 100,000 tonnes” was taken as 200,000 tonnes.

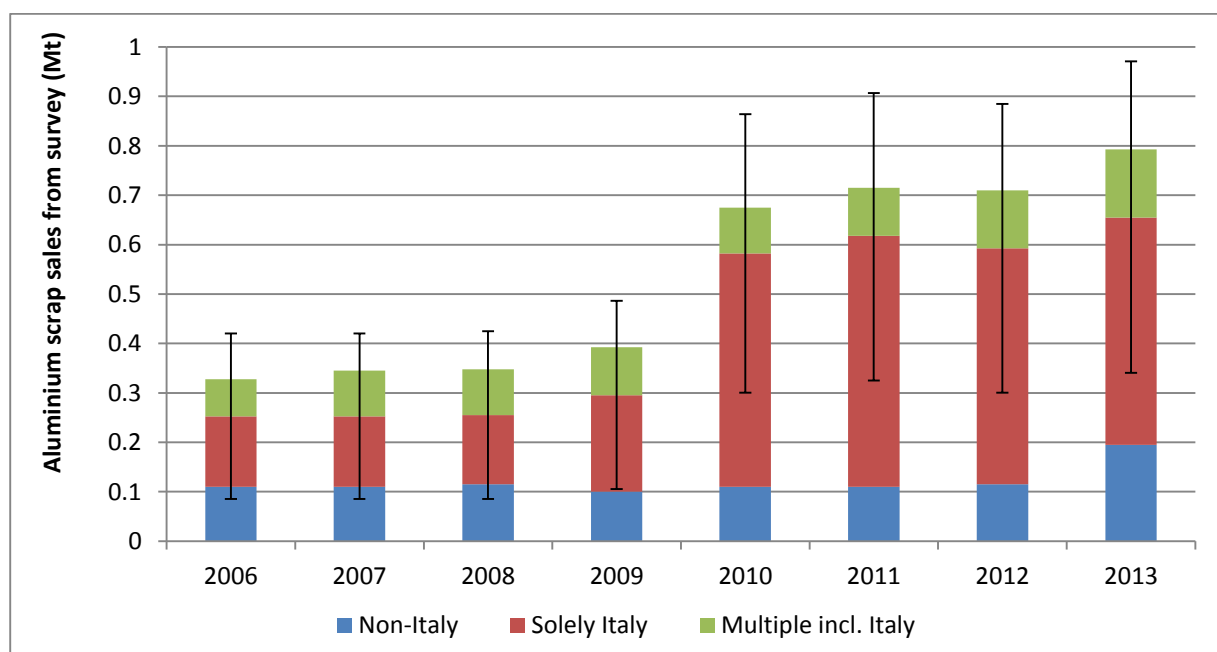


Figure 55: Sales of aluminium scrap from survey data, differentiating between firms operating solely in Italy and firms that operate in at least one other Member State, thousands of tonnes (the number of respondents for each year (2006-2013) were 68, 69, 70, 72, 73, 75, 75 and 77)

Figure 56 provides an estimate on the sale of end-of-waste compliant iron/steel scrap by grade for 2012. The values are reported as a percentage of the intra- and total-EU28 imports. These values are subject to uncertainty as they have been extrapolated from the survey responses, which reported tonnages in ranges and assume a relatively constant breakdown of scrap by grade for each respondent.

This uncertainty is depicted in the error bars on the graph, where the lower and upper bounds of the survey tonnage ranges have been used to calculate the estimated sales volume and then percentages of end-of-waste compliant scrap. Figure 56 reinforces the analysis of Figure 45, that uptake of end-of-waste is more prevalent in the high volume and high value scrap grades (old, shredded, new production and stainless scrap).

Figure 57 provides an estimate on the sale of end-of-waste compliant aluminium scrap by grade for 2012. The values are reported as a percentage of the intra- and total-EU28 imports. Again, these values are subject to uncertainty as they have been extrapolated from the survey responses, which reported tonnages in ranges and assume a relatively constant breakdown of scrap by grade for each respondent. Perhaps unsurprisingly, for both scrap iron/steel and aluminium, the grades with the highest proportion of end-of-waste are either the cleanest grades or those with the largest overall tonnages.

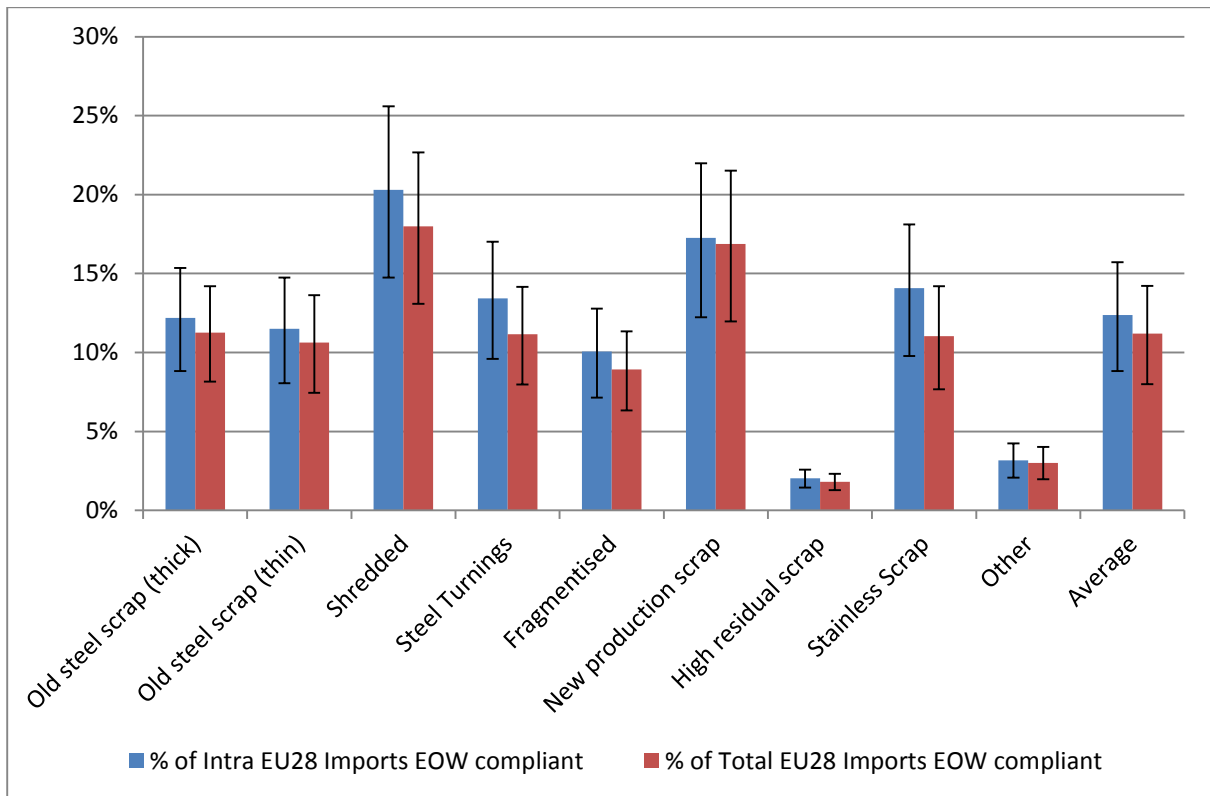


Figure 56: Estimated sale of end-of-waste compliant iron/steel scrap by grade, 2012 (%)

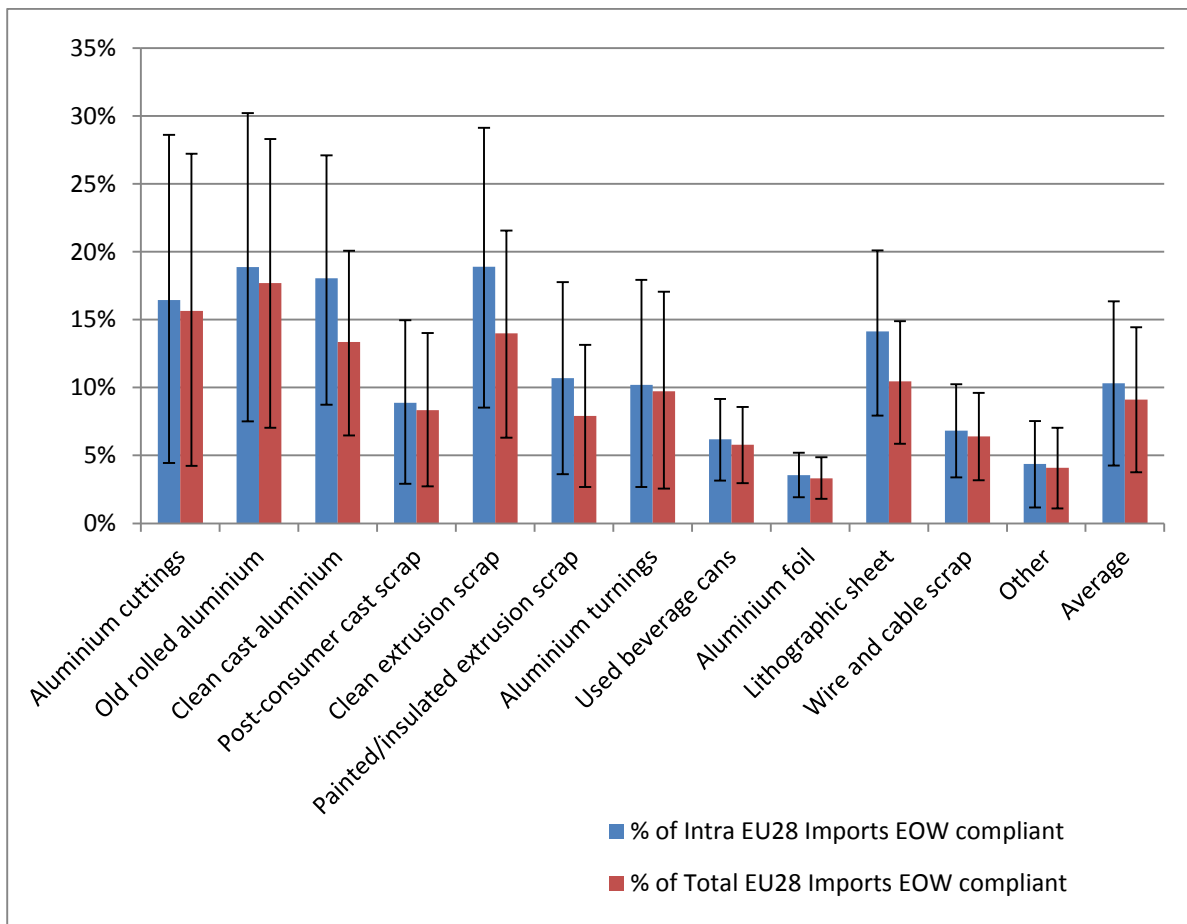


Figure 57: Estimated sale of end-of-waste compliant aluminium scrap by grade, 2012 (%)

4.2.7 Scrap purchase and use (iron and steel)

Eight steelworks provided responses to the industry survey; six declared that they use or purchase steel scrap and two did not provide a response. Figure 58 shows the number of steelworks that import steel scrap from inside and outside the EU. The only country from outside the EU reported as a source of imported scrap was Russia. Five countries were reported as a source of steel scrap from inside the EU: Denmark, Estonia, Greece, Italy and Latvia.

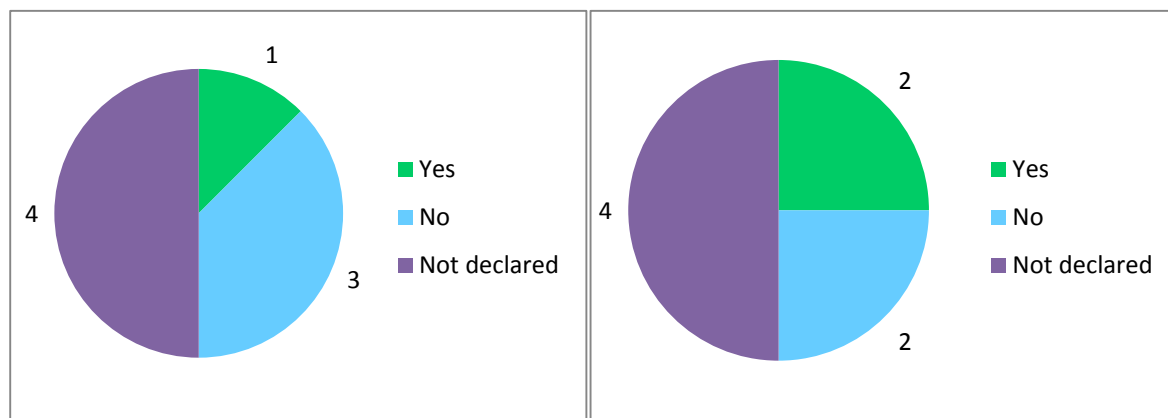


Figure 58: Number of steelworks that...
Left: ...import steel scrap from outside the EU
(8 respondents)

Right: ...import steel scrap from inside the EU
(8 respondents)

Figure 59 shows that half of the respondents use or purchase end-of-waste compliant scrap from within the EU. One respondent indicated nil purchase of end-of-waste compliant scrap from within the EU; the remaining participants did not provide a response.

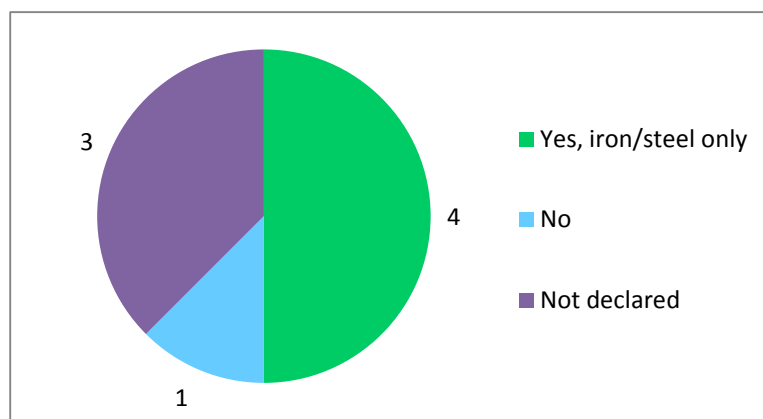


Figure 59: Number of steelworks that use or purchase end-of-waste compliant metal scrap from within the EU (8 respondents)

The respondent who did not use or purchase end-of-waste compliant scrap reported that the main reason for this was that “Swedish steel mills do not see any reason to start to use end of waste steel scrap”. Those that did use or purchase end-of-waste compliant scrap reported a number of reasons for using compliant scrap and not solely non-compliant scrap, as shown in Figure 60.

One respondent provided an additional response, stating that compliance is required by the Competent Authorities in Italy as a guarantee of better environmental practices. There were three responses to the question “Would you consider increasing your purchase of end-of-waste compliant scrap?”: all three reported that they would (Figure 61). No respondent provided reasons for not wanting to increase purchases of end-of-waste compliant scrap.

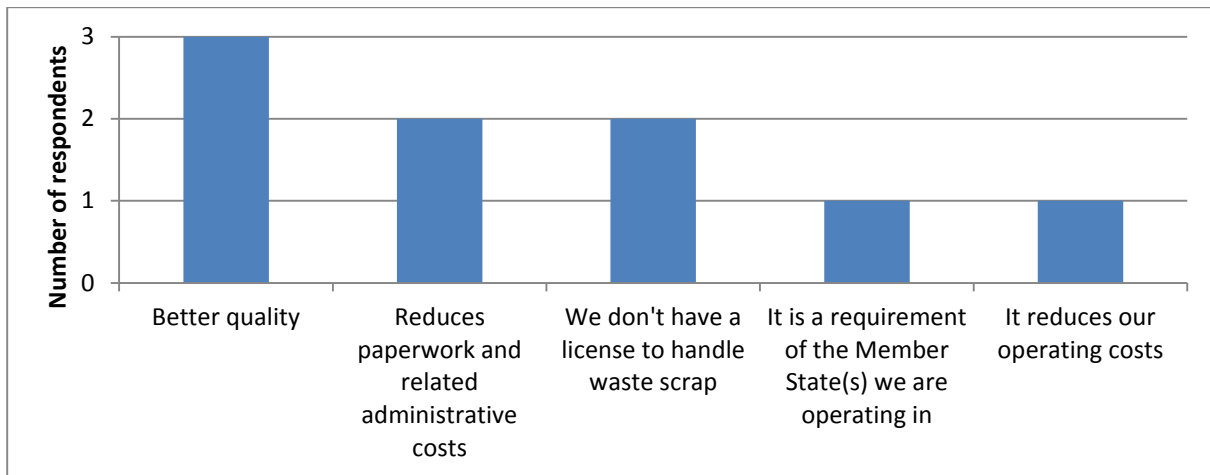


Figure 60: Respondents' main reasons for purchasing end-of-waste compliant scrap and not solely non-compliant scrap (iron/steel scrap) (3 respondents)

Four respondents provided annual purchase/import tonnage data; however, only one respondent provided tonnage data for all nine years from 2006 to 2014. One respondent reported annual tonnages of fewer than 10,000 tonnes, two respondents reported annual tonnages of more than 200,000 tonnes, while the last respondent reported annual tonnages of either 100,000-200,000 tonnes or more than 200,000 tonnes for each year.

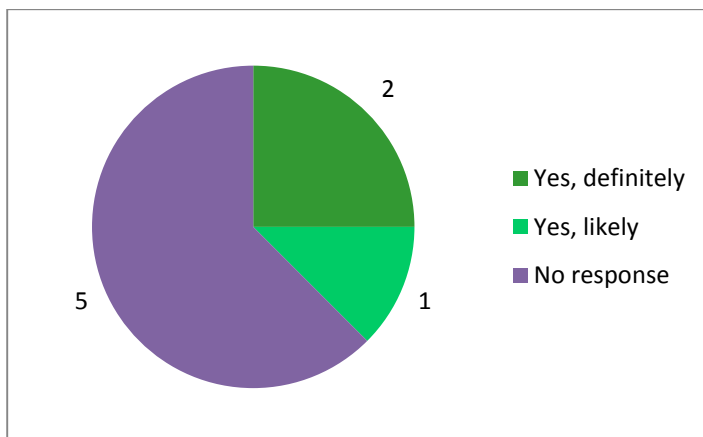


Figure 61: Respondents who would consider increasing purchase of end-of-waste compliant steel scrap (8 respondents)

Of the four respondents who provided annual purchase/import tonnage data, three declared that all of their purchases/imports came from within the EU. No respondents reported that any iron/steel purchases/imports came from outside the EU. Three respondents provided information on the percentage of iron/steel purchases or imports that were end-of-waste compliant. Two of them (both of whom reported annual purchases/imports of more than 200,000 tonnes) declared that all of their purchases or imports were end-of-waste compliant. The remaining respondent reported a range of end-of-waste compliance, from 5 % for shredded and steel turnings to 40 % for old steel (thick). This respondent reported annual purchases/imports of fewer than 10,000 tonnes.

The lack of information from survey respondents on scrap purchases by grade and the limited number of respondents who provided tonnage data makes it difficult to estimate the tonnages of end-of-waste compliant scrap by grade. From the responses provided, the respondents used at least 400,000 tonnes of end-of-waste compliant scrap in 2012 (however, if the upper bounds of the survey tonnage ranges is used, this could have been as much as 810,000 tonnes). This is 1.3-2.6 % of total intra-EU28 imports of iron and steel scrap in 2012 (Comext); however, this does not include trade of scrap internal to countries.

4.2.8 Scrap purchase and use (aluminium)

14 aluminium works provided responses to the industry survey. Of these 14 respondents, 12 declared that they used or purchased aluminium scrap and two did not provide a response. Figure 62 shows the number of aluminium works that import aluminium scrap both from within and beyond the EU. Respondents reported a wide range of countries as sources for aluminium scrap imports, including Armenia, Iceland, North Africa, Norway, South America, Switzerland, Turkey, UAE and the USA.

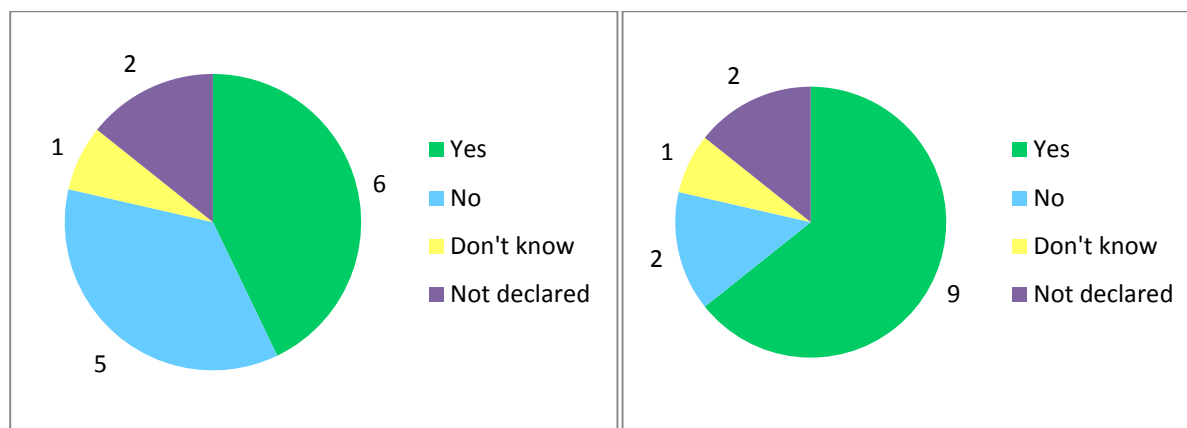


Figure 62: Number of aluminium works that import aluminium scrap from...

Left: ... outside the EU (14 respondents)

Right: ... inside the EU (14 respondents)

Nine respondents provided information on their sources of aluminium scrap from within the EU. The most commonly cited sources for aluminium scrap were France, Germany and Italy (Figure 63). Between the nine respondents, 24 different source countries were identified. Aluminium works appear to have a diverse range of scrap sources; all nine respondents identified at least two source countries. Figure 64 shows respondents' main reasons for not purchasing end-of-waste compliant scrap, with insufficient supply of compliant scrap being the most commonly cited reason.

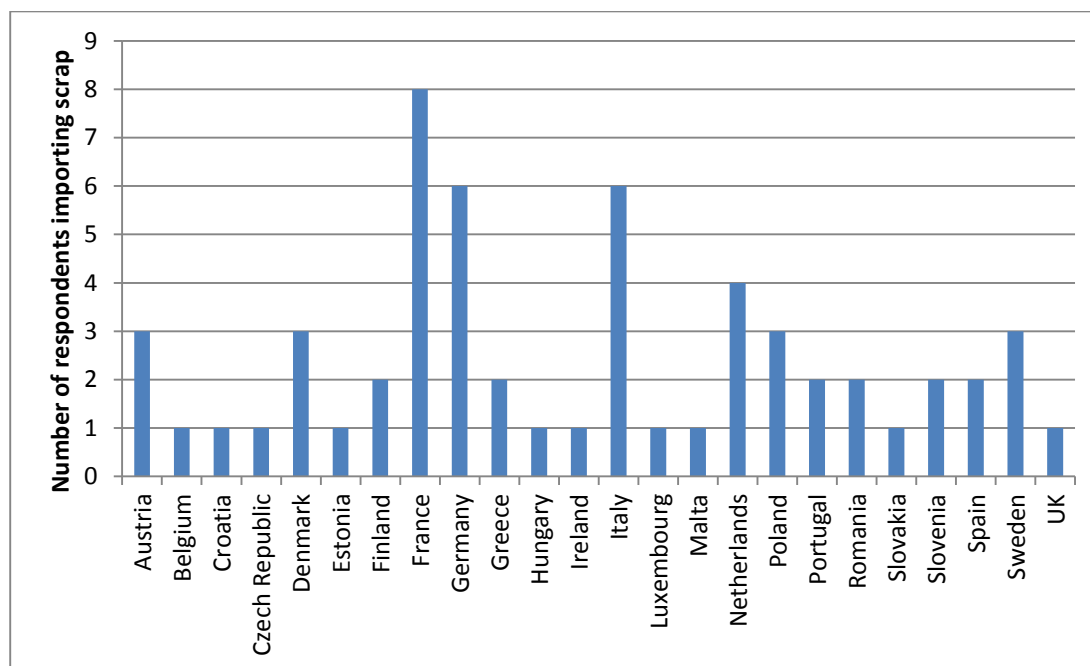


Figure 63: Countries within the EU identified as sources for importing aluminium scrap (9 respondents)

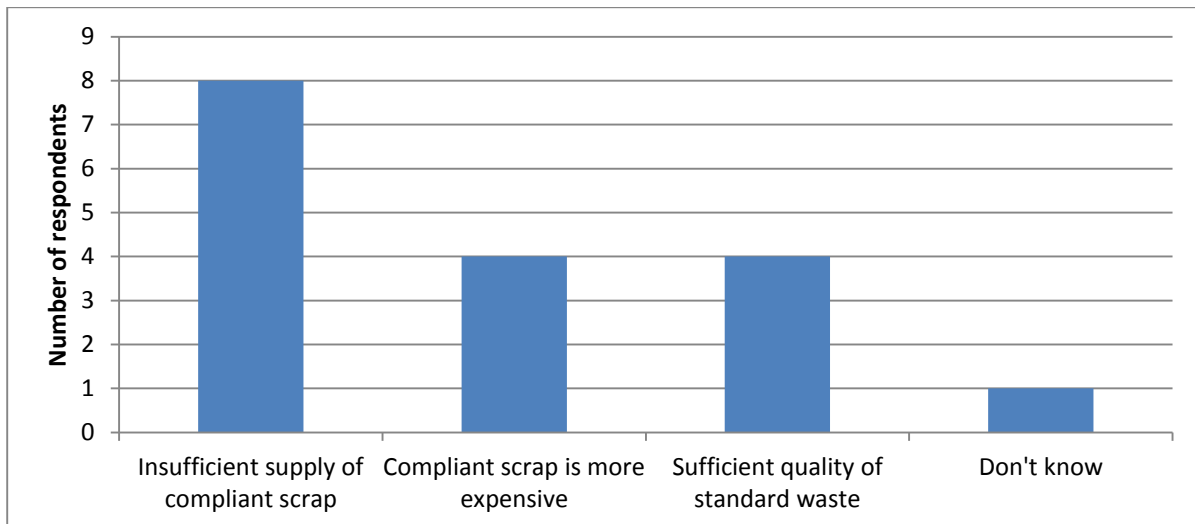


Figure 64: Respondents' main reasons for not purchasing end-of-waste compliant scrap (9 respondents)

Two of the respondents made additional comments. The first commented that, to their knowledge, there is no compliant scrap in the UK. The second commented that end-of-waste compliant scrap is better quality than non-compliant scrap, and is therefore in more demand in the global and constrained scrap market. The respondent suggests that, in the EU, refiners have always had to be equipped to deal with lower quality scrap and therefore have the facilities and technologies to process most standard waste scrap.

Figure 65 shows the respondents' main reasons for using end-of-waste compliant scrap, with 'better scrap quality' appearing as the most commonly cited reason. A reduction in paperwork and administrative costs were also listed as reasons for using compliant scrap.

No respondents reported that company image, tax reductions or subsidies, or a lack of a license to handle waste scrap were their reasons for using end-of-waste compliant scrap and not solely non-compliant scrap. Two respondents provided further information: the first stated that compliant scrap would only be bought if it were the same price as equivalent non-compliant scrap. The second expanded upon the motivation of better quality: *"Better quality: for most companies this is the only reason. Any possible savings in terms admin cost, paper work, and etc. is related to extra-EU import and export. Most of the EU refiners do not import Al scrap on their own."*

The majority of survey respondents would consider increasing their purchases of end-of-waste compliant scrap, as shown in Figure 66. Only one respondent would be "Unlikely" to increase purchases of end-of-waste compliant scrap. The responses shown in Figure 67 reinforce those in Figure 64: the main reason for respondents not wanting to increase purchases of compliant scrap is that there is insufficient supply. Respondents also perceived that compliant scrap is more expensive and that standard waste is of a sufficient quality for their purposes.

Two respondents made further comments on the issue of availability: the first reported that no compliant scrap was available; the second reported that *"There is insufficient knowledge of the benefits of, and therefore availability of compliant scrap"*. 13 out of the 14 respondents provided data on their annual purchases/imports of aluminium scrap. However, not all respondents provided data for all years from 2006 to 2014. The range of tonnage data reported by the survey participants is shown in Figure 68. The largest amount of tonnage data has been provided by respondents who report purchases/imports of over 100,000 tonnes of aluminium scrap per year.

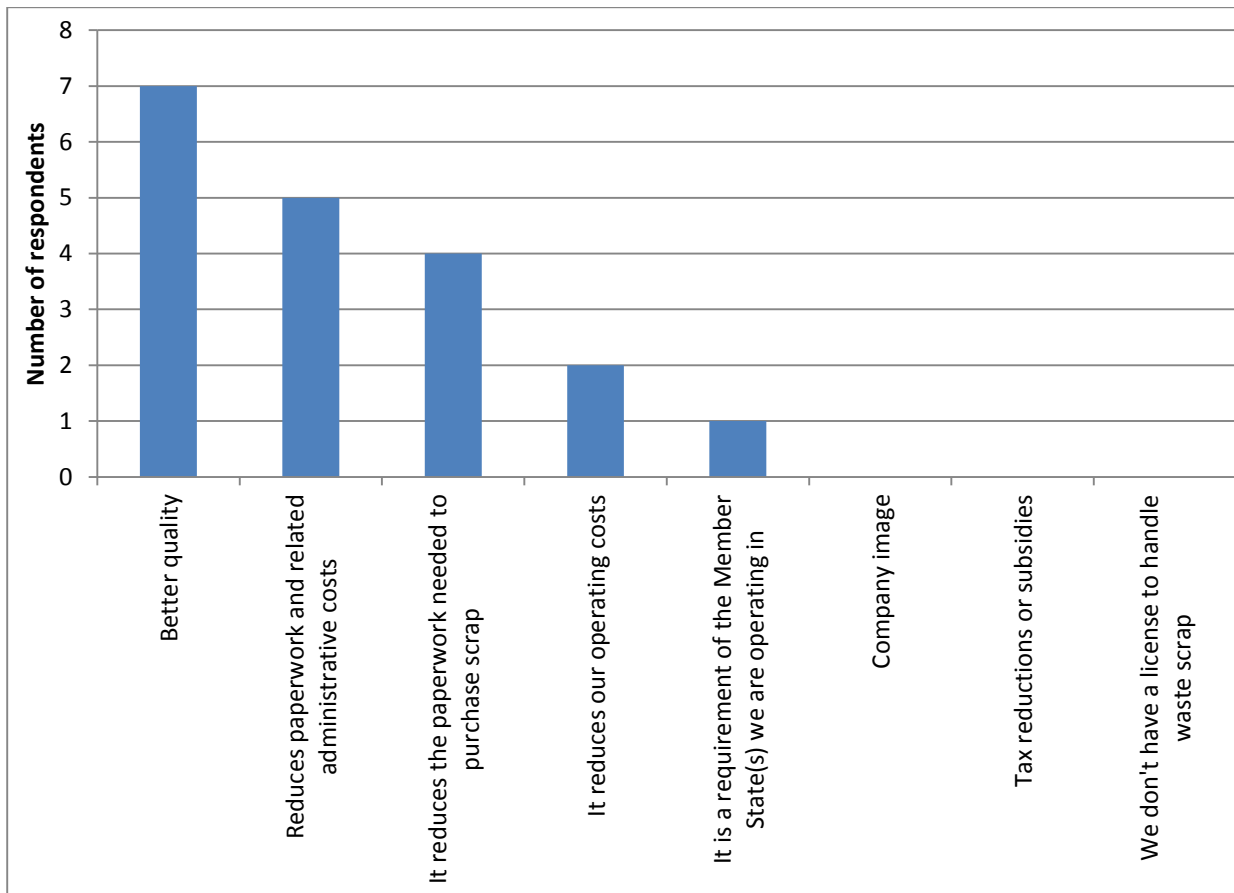


Figure 65: Respondents' main reasons for using end-of-waste compliant scrap and not solely non-compliant scrap (11 respondents)

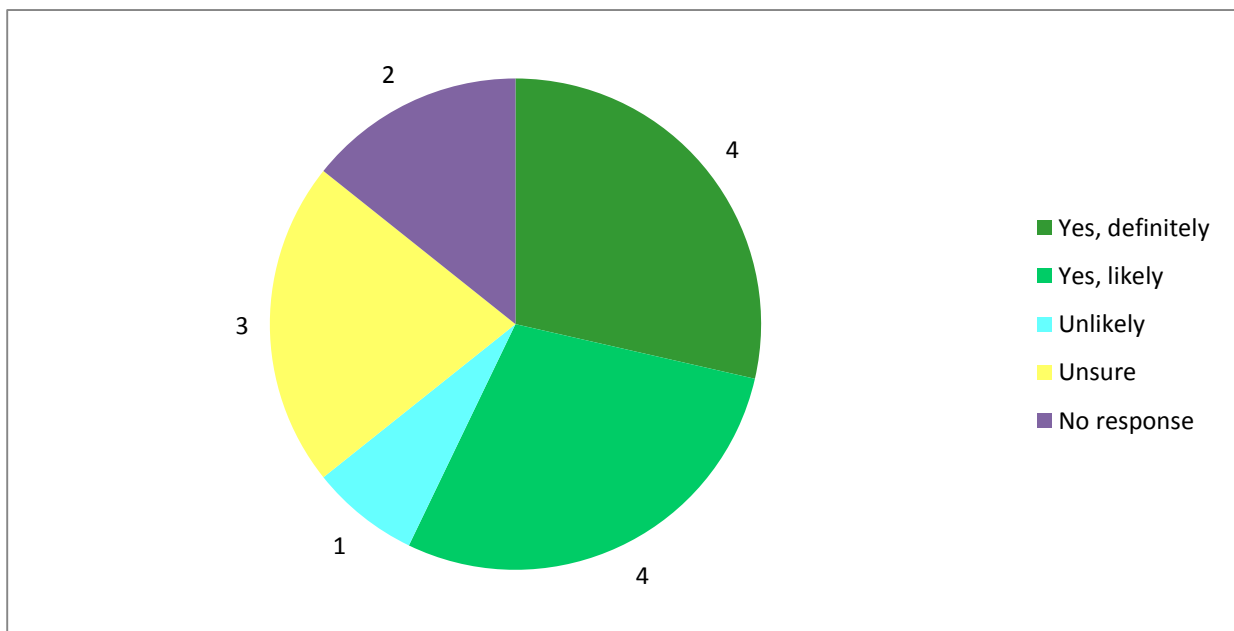


Figure 66: Respondents who would consider increasing their purchase of end-of-waste compliant aluminium scrap (14 respondents)

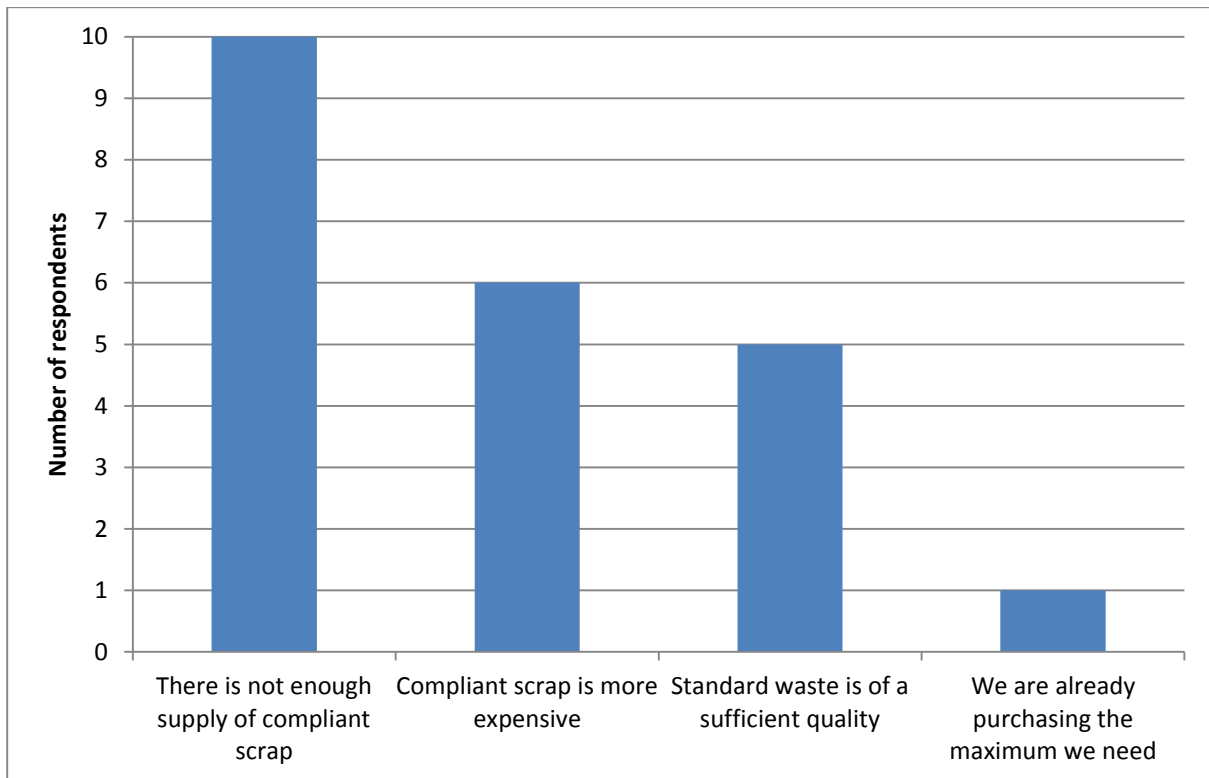


Figure 67: Respondents' main reasons for not wanting to increase purchases of end-of-waste compliant aluminium scrap (11 respondents)

All of the survey respondents provided information on the breakdown of their scrap consumption between purchases from within the EU and imports from outside the EU. Only 5 % of scrap aluminium purchases came from outside the EU. The survey coverage totals around 900,000 tonnes of scrap aluminium, split evenly between 'Italian', 'multiple' and 'non-Italian' companies (Figure 69).

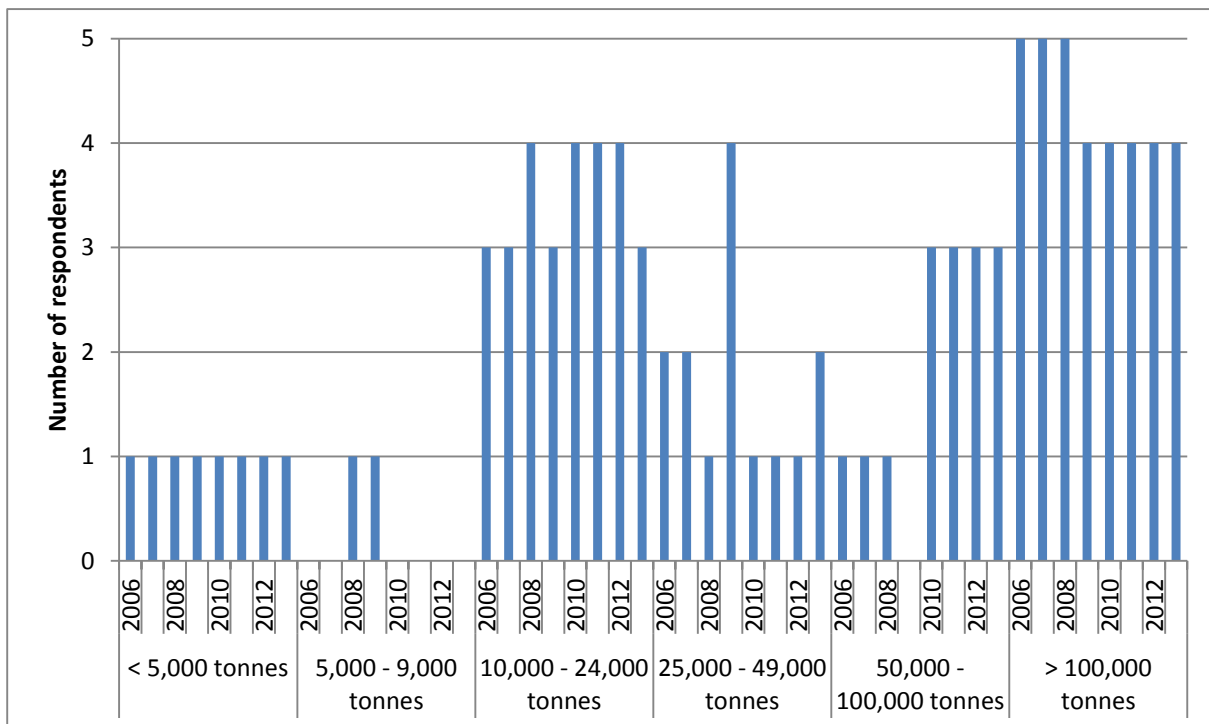


Figure 68: Purchases/imports of aluminium scrap by year (14 respondents)

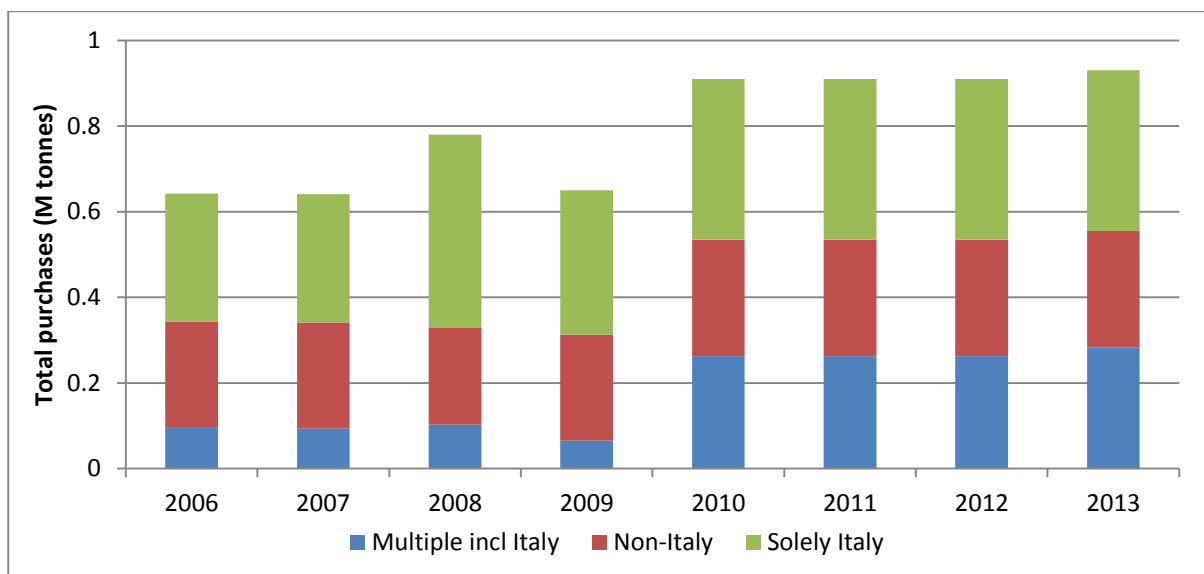


Figure 69: Estimated annual purchases of aluminium scrap reported by survey respondents, differentiating solely Italy, multiple and non-Italy companies (14 respondents)

Figure 70 provides an estimate on the purchases of end-of-waste compliant aluminium scrap by grade for 2012. The values are reported as a percentage of the intra- and total-EU28 imports. These values are subject to uncertainty as they have been extrapolated from the survey responses, which reported tonnages in ranges and assume a constant breakdown of scrap by grade for each respondent.

This figure suggests that end-of-waste compliant scrap made up between 7 % and 21 % of aluminium scrap purchases in 2012 (average 11 to 12 %), with the highest percentages observed for clean cast aluminium, lithographic sheet and clean extrusion scrap.

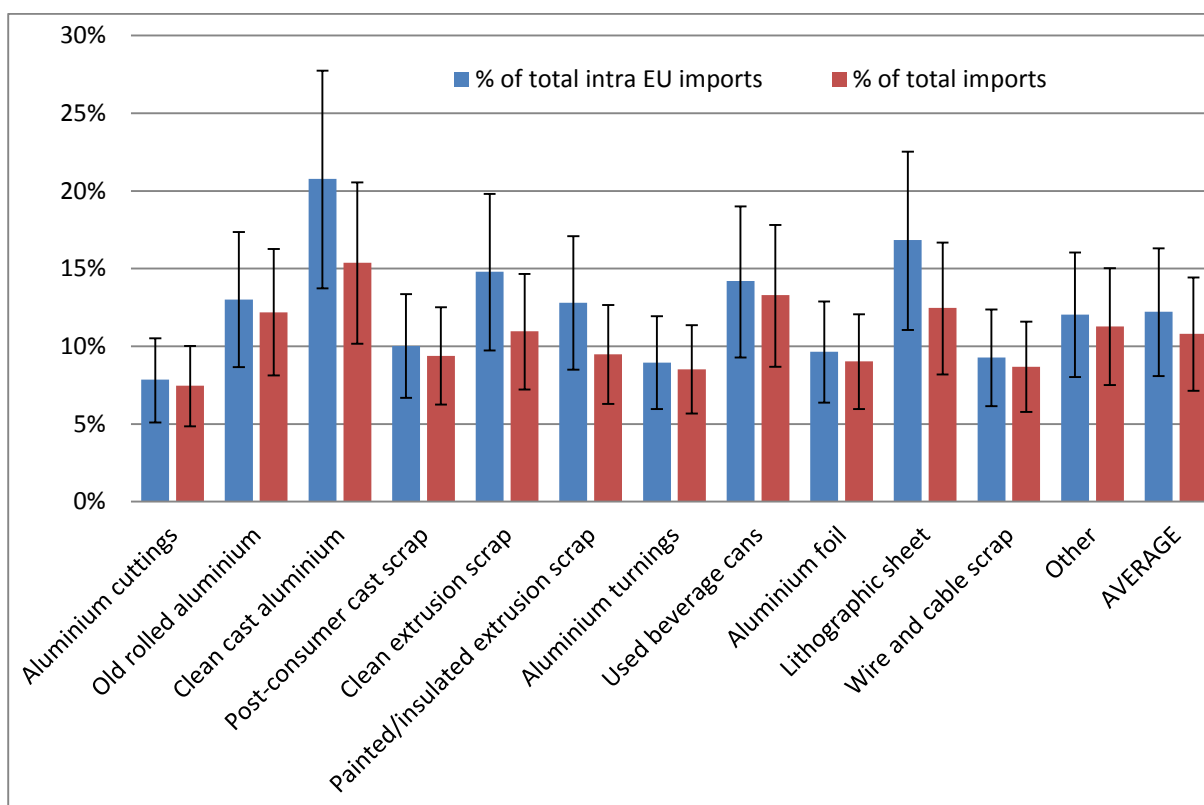


Figure 70: Estimated purchases of end-of-waste compliant aluminium scrap by grade, 2012 (%)

4.3 *EU estimates for end-of-waste metal scrap*

In this section of the report, an estimate of the EU uptake of end-of-waste criteria for metal scrap is presented. The analysis is shown in terms of the number of end-of-waste compliant scrap companies operating in the market and the tonnes of compliant scrap available for purchase. The section begins by describing the data extrapolation methodology chosen and the key data sources used.

4.3.1 Data extrapolation methodology

This study has collected a large dataset from across Europe on the uptake and use of end-of-waste criteria for metal scrap. In particular the industry survey received 246 responses from across Europe, mostly from individual companies. This is clearly a relatively large statistical survey of companies, which was greatly facilitated by the involvement of the industry associations in disseminating the survey to their members. Using the information collected, it has been possible to conduct a great deal of analysis.

For the study report a key objective was to develop a robust methodology to extrapolate this dataset to obtain an accurate estimate of the proportion of scrap iron, steel and aluminium that is end-of-waste compliant across Europe. Under the assumption that the data sample received is **random, or at least unbiased**, it is possible to extrapolate the survey data up to EU-level by using data available from Eurostat on the EU population of scrap companies. The data from the scrap companies could then be triangulated against data received from the steel and aluminium industries. Clearly double counting would need to be avoided, but this approach could be used to help to fill any apparent gaps in coverage in one part of the survey with data obtained from other parts of the survey.

However, **the key assumption on the data sample being random, or at least unbiased, was not met**. For example, analysis of the survey dataset quickly revealed a very large number of responses from Italy, rather than being representative of the EU as a whole. It was therefore clear that the sample data considerably over-emphasises data from Italian companies, which responded more enthusiastically to the industry survey. If this was the only issue with the sample data, it would be possible to re-weight the survey data to match the population of companies in individual or groups of EU Member States. Further robustness checks could then involve reviewing participation by company size.

This proposed data extrapolation methodology was presented and discussed at the study expert workshop held on 31 March 2014 in Brussels. Several concerns were raised regarding its suitability and robustness. In particular, a key concern was raised about the representativeness and coverage of the survey data collected. Some of these issues have been described above, alongside possible mitigation strategies. However, a central concern still remained on whether the sample was sufficiently unbiased to use such a method to extrapolate the data.

The major concern was that the **companies most likely to participate in the industry survey on end-of-waste were those that were already operating to, or compliant with, the criteria**. This concern is not easily overcome with any statistical fix, other than perhaps conducting a random telephone survey on the subject. However, a survey would be time-consuming and expensive, and therefore beyond the scope of work possible within this study. It may also be quite difficult to obtain a completely random sample, as it is likely to rely on industry associations to suggest and provide contact details, and it is still the companies that are already end-of-waste compliant who are most likely to respond to such a telephone survey.

Given the pitfalls identified for these statistical approaches, an alternative data extrapolation method has been used in this study. The method involves summing the number of companies and actual tonnages of end-of-waste compliant metal scrap declared to be operating or available in the market. Some estimation would still be required, given that companies were only asked to put their company size within specific ranges in order to protect commercial sensitivity, and care would still need to be taken to avoid any double-counting of end-of-waste scrap sold and bought by different actors. However, this approach will be considered to yield a **lower bound of the overall EU uptake for end-of-waste**.

4.3.2 Key data sources used

Several data sources are available to use for the data extrapolation:

- From the industry survey, 246 responses were received from across Europe, mostly from individual companies; although not all of the companies chose to provide this commercially sensitive data.
- A number of national industry associations collated data on the uptake of end-of-waste amongst their membership. This data was returned through the completion of a standard pro-forma emailed out to all of the industry associations, following requests at the expert workshop.
- Information was collected from the Competent Authorities survey on the number of companies registered for end-of-waste in specific EU Member States, where this was known (see Chapter 6).
- Comments made by industry experts at the Brussels workshop provided some further data.

Industry association submissions

The following tables summarise the information provided by the key industry associations, in terms of the number of companies and tonnes of scrap metal accounted for by their membership. Most data provided was either for 2012 or 2013, although some associations provided more approximate or average figures. Note: none of the Europe-wide industry associations was able to provide specific information on the uptake of end-of-waste across Europe, meaning that the national submissions gained greater importance.

Table 8: Data coverage provided by EU steel associations (scrap steel consumption), 2012-13

Association	Country	No. Members	Total Volume (Mt)	EoW Volume (Mt)	% EoW
Eurofer	Europe	43 companies 16 associations	93.5	N/A	N/A
Federacciai	Italy	31 over 38 sites	18.0	13.0	72 %
WVS & Vdeh	Germany	79 & 160 (mostly located in Germany)	19.2	0.01	0.05 %
UNESID	Spain	41	11.0	≈0.30	<5 %
UK Steel	UK	24	2.4	0.0	0 %
FFA	France	29	-	N/A	N/A
			Coverage: 50.6	EoW Total: 13.3	

Table 9: Data coverage provided by EU ferrous scrap associations (scrap steel generation), 2012-13

Association	Country	No. Members	Total Volume (Mt)	EoW Volume (Mt)	% EoW
EFR	Europe	3,500 companies 11 associations	110.0	N/A	N/A
Assofermet	Italy	≈400 respondents out of 1000 members but provided wider information	13-14	≈9.5	≈70 %
BDSV	Germany	550	13.0	0.3	2.3 %
FER	Spain	435	6.5	0.1e	≈2 %
BMRA	UK	298	13.0	0.0	0 %
FEDEREC	France	550	12.9	0.2	≈2 %
MRF	Netherlands	160	2.3	0.01	0.4 %
HOE	Hungary	55, of which 29 in scrap metal but provided wider information	1.5	0.0	0 %
			Coverage: 62.7	EoW Total: 10.1	

For steel, EU scrap consumption is put at approximately 93.5 million tonnes per year and EU scrap steel generation at 110 million tonnes, the difference being exported to outside the EU (average annual figures

from Eurofer, see Chapter 3 for details). The industry associations who provided specific data accounted for over 50 % of both scrap steel generation and consumption. At least 13 million tonnes of scrap steel is listed as being end-of-waste (EoW) compliant because the Italian steel works represented by Federacciai report it as such. Only a very small amount of end-of-waste compliant scrap is consumed outside Italy.

For aluminium, EU scrap consumption is put at approximately 4 million tonnes per year and EU scrap generation at 4.5 million tonnes, the difference being exported outside the EU (average annual figures from CRU, see Chapter 3 for details). The industry associations that provided specific data, however, accounted for a smaller proportion of scrap aluminium generation and consumption. At least 400,000 tonnes of scrap aluminium is listed as being end-of-waste compliant, most of which was declared by Assofermet, the Italian scrap association. Data on end-of-waste was provided by ASSIRAL, the Italian Aluminium Refiners Association, but this was asked to be kept confidential. Their estimate for end-of-waste is below that provided by Assofermet, which is presumed to have slightly wider industry coverage.

Table 10: Data coverage provided by EU aluminium associations (scrap aluminium consumption), 2012-13

Association	Country	No. Members	Total Volume (Kt)	EoW Volume (Kt)	% EoW
EAA	Europe	76 companies 16 associations	4,000	N/A	N/A
ASSIRAL	Italy	5	600	Confidential	Confidential

Table 11: Data coverage of non-ferrous scrap associations (scrap aluminium generation), 2012-13

Association	Country	No. Members	Total Volume (Kt)	EoW Volume (Kt)	% EoW
EUROMETREC	Europe	3,500 companies 13 associations	4,500	N/A	N/A
Assofermet	Italy	≈400 respondents out of 1000 members but provided wider information	700-800	≈375	≈50 %
FER	Spain	435	250	≈5.0	≈2 %
BMRA	UK	298	400	0	0 %
FEDEREC^a	France	400	160	10.0	≈3 %
MRF	Netherlands	160	180	1	0.6 %
HOE	Hungary	55, of which 29 in scrap metal but provided wider information	91	9.3	10.2 %
			Coverage: 1,831	EoW Total: 400	

Industry survey data submissions (excluding industry associations)

A considerable amount of data has been collected from the industry survey on the use of end-of-waste criteria for metal scrap. As with the trade association submissions, data is available on scrap generation and scrap consumption – i.e. sales and purchases. However, only a proportion of the companies that participated in the industry survey chose to provide such quantitative data.

The graphs below compare the industry survey coverage from the scrap industry, which generates and sells steel and aluminium scrap, and the steel and aluminium works, which purchase and use steel and aluminium scrap. The data highlights some differences between scrap sellers and buyers:

^a FEDEREC conducted a survey of their members and out of the 39 companies who responded to their survey, 13 were already end-of-waste compliant (one third of the survey), with another 5 currently implementing (taking the total to nearly half). However, as there are 500 scrap metals companies in France; this means that the lower bound estimate of the uptake for end-of-waste in France is around at least 2-3%, in line with the above methodology described. Actual tonnage data on the quantities of end-of-waste scrap generated by these companies was also provided.

- For steel, the survey data accounted for approximately 5.6 million tonnes of scrap steel sold onto the market (depending upon the year chosen), although the survey data only accounted for purchases of nearer 1.3 million tonnes of scrap steel (including that declared by brokers). Clearly, there is a significant difference here in the tonnages declared in the survey by sellers and buyers respectively. Some of the difference may be due to exports of scrap, but more likely it is because of differences/gaps in the survey coverage.
- For aluminium, the survey data accounted for around 0.7-0.8 million tonnes of scrap aluminium sold and bought in a given year. In contrast to steel, the quantity of aluminium scrap sold or exported according to the scrap industry is less than the purchases or imports of scrap according to the aluminium works, although the difference is much lower in magnitude.

The data extrapolation method will aim to include as much of this additional information as possible, whilst taking care to avoid any double counting of material, either between sellers and buyers, or between the data provided by the industry associations and that submitted via the industry survey.

In terms of the tonnages of end-of-waste compliant scrap inside the EU, Figure 71 shows the estimated sales and purchases, as reported by survey participants. The industry survey data accounts for nearly 4 million tonnes of end-of-waste compliant scrap steel sold onto the market and about 640,000 tonnes purchased. The response from the scrap industry on the sale of steel scrap has more than 4 times greater coverage than the response from the steel industry on the purchases of scrap.

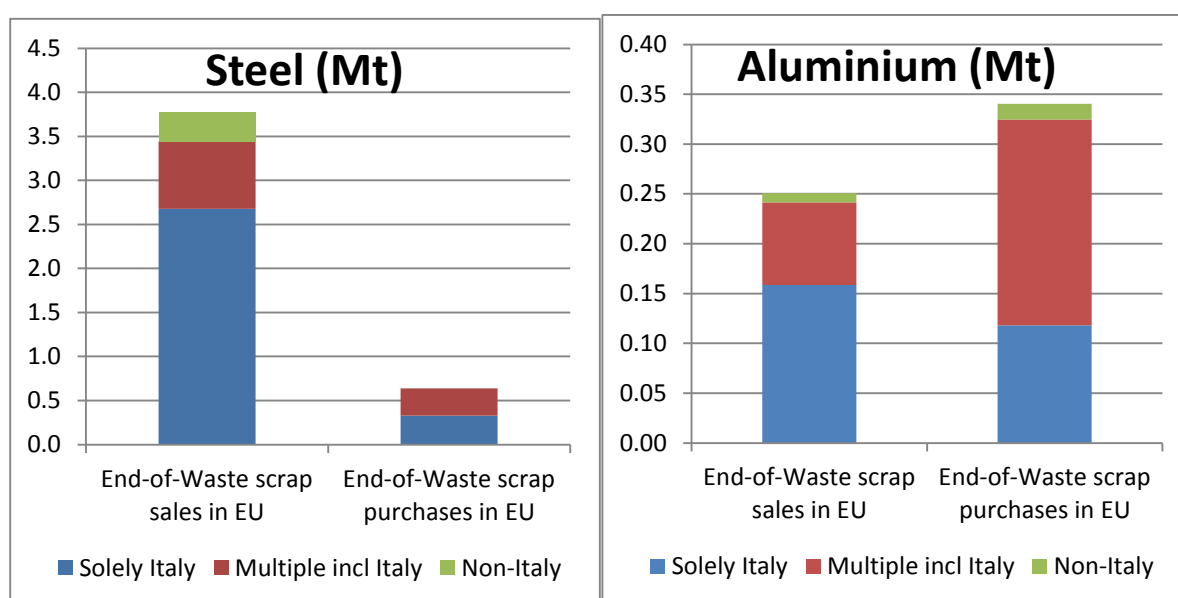


Figure 71: Estimated end-of-waste compliant scrap transactions inside the EU, split by Italy, multiple and non-Italy companies, based on survey responses only (around 60 respondents for each metal)

As for aluminium, the industry survey data accounts for around 340,000 tonnes purchases of end-of-waste compliant aluminium scrap and approximately 250,000 tonnes of sales. There were fewer responses from the scrap industry on the sale of aluminium scrap than responses from the aluminium industry on the purchases of scrap; however, the difference in coverage is less marked than for steel scrap. This suggests that the responses from the scrap industry are likely to be more representative than the responses from the industry for steel, and are likely to be less representative than the response from industry for aluminium.

The data presented in Figure 71 have been disaggregated by geographic origin of the companies selling and buying the scrap. This is to highlight the end-of-waste tonnages that are likely to be already captured within the industry association data submissions. Clearly, arisings from 'solely Italy' are well captured by those submissions, so these should not be added into the final data extrapolation; otherwise there would obvious double-counting in the final statistics. Arisings from 'multiple countries including Italy' and 'non-

Italy' (covering 18 different countries notably Germany, France, Spain, Ireland Slovenia, Croatia, Lithuania) will only be at best partially covered in the industry association data.

4.3.3 Number of EU companies that are end-of-waste compliant

The first task in the data extrapolation is to estimate the total number of companies that are operating to end-of-waste criteria. Three main data sources have been provided in this study that can be used for this aggregation: Industry survey, Authorities survey and Associations survey. However, each of these data sources provides only a partial picture; whether that is due to partial survey or country coverage, or that companies do not legally need to be registered by authorities as being end-of-waste compliant.

This study estimates that there are at least 1,000 scrap companies certified/generating end-of-waste compliant scrap in Italy and a further 100 scrap companies outside Italy in other countries of the EU. Table 12 provides a summary of the data/estimates received, which is summarised in the map shown in Figure 103. Over 90 % of the end-of-waste (EoW) compliant scrap companies are located in Italy.

Table 12: Estimates of the number of scrap companies operating to end-of-waste by country (Note: some of these 'companies' represent subsidiary divisions of multinational companies)

Country	No. companies generating EoW	No. companies EoW registered	No. companies producing EoW compliant quality
Italy	137	1,000	1,000-1,500
Austria	7	1-10	5
Belgium	2	1-10	
Bulgaria	2	0	
Croatia	2		
Cyprus	0		
Czech Republic	2	1-10	
Denmark	1		
Estonia	0	0	
Finland	0	0	
France	15	0	13
Germany	16		10
Greece	3		
Hungary	2	0	3
Ireland	1	1-10	
Latvia	0		
Lithuania	1		
Luxembourg	1	0	
Malta	2	0	
Netherlands	2	0	3-5
Poland	3		
Portugal	3	1-10	
Romania	2		
Slovakia	2	0	
Slovenia	9	0	
Spain	10		7
Sweden	1	0	
United Kingdom	2	0	0
Norway (EEA country)	0	0	

Source:

Industry Survey

Authorities survey

Associations/ Expert Workshop

The information provided at the expert workshop and in the industry association submissions makes it clear that all EU steel and aluminium works are technically able to receive and process end-of-waste compliant scrap. However, at present, it appears that all of the Italian steel and aluminium works seem to receive end-of-waste compliant scrap. This includes at least 31 steel-producing companies (at 38 sites) and at least 5 aluminium refiners, as noted in the industry association submissions from Federacciai and ASSIRAL respectively. However, in addition, a small number of German and Spanish steel works also definitely receive end-of-waste compliant scrap currently.

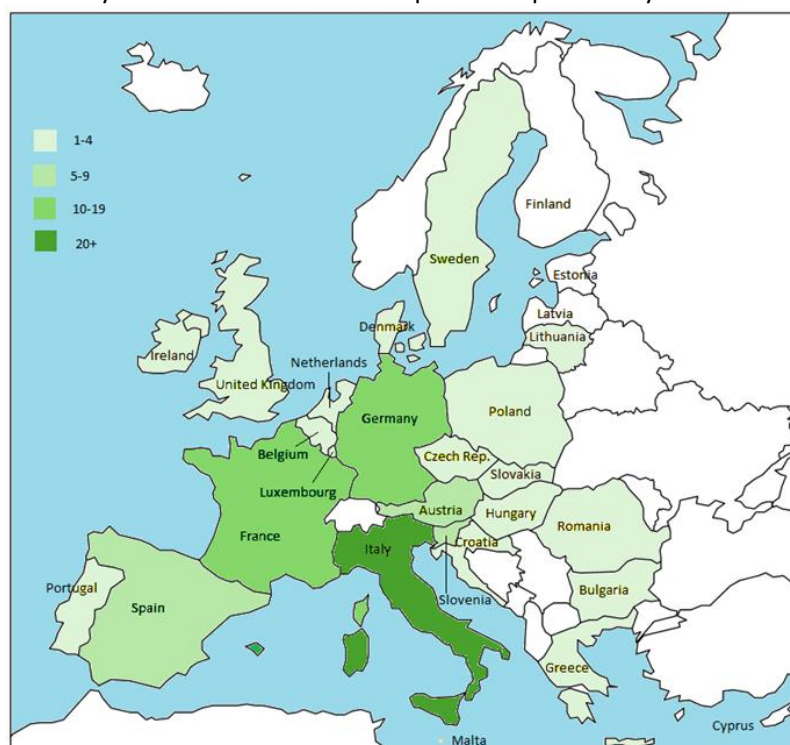


Figure 72: Geographical coverage of companies generating end-of-waste scrap (153 respondents)
Source: Scrap industry survey

4.3.4 Tonnages accounted for that are end-of-waste compliant in EU

In this section the finalised figures for the tonnages of end-of-waste (EoW) compliant scrap are determined, bringing together the industry associations and survey data (Table 13):

- For steel, the association statistics show that at least 13.5 million tonnes of end-of-waste compliant scrap steel was purchased in the EU in 2013, approximately 15 % of the whole EU market. A slightly lower estimate is given for sales, most likely reflecting some gaps in coverage for the industry survey. Due to the difference in sources providing figures for purchase and sales, it is impossible to estimate how much of this difference represents imports and how much can merely be attributed to data uncertainty.
- For aluminium, EU sales of end-of-waste compliant scrap are estimated at around 450,000 tonnes per year, or around 10 % of total aluminium scrap generation. Limited data on purchases was provided by aluminium associations, but the survey total is relatively close to the sales figure.

Table 13: Estimates for end-of-waste complaint scrap purchase and sales

Steel	EoW Purchases	EoW Volume (Mt)	EoW Sales	EoW Volume (Mt)
	Italy (Federacciai)	13.0	Italy (Assofermet)	9.5
	Other Associations	0.31	Other Associations	0.76
	Survey – non-Italy	0	Survey – non-Italy	0.34
	Survey – multiple including Italy*	0.15	Survey – multiple including Italy*	0.38
	EU Total	13.46	EU Total	10.98

Aluminium	EoW Purchases	EoW Volume (Kt)	EoW Sales	EoW Volume (Kt)
	Associations	N/A	Italy (Assofermet)	375
	Survey – Italy	118	Other Associations	25
	Survey – non-Italy	16	Survey – non-Italy	41
	Survey – multiple including Italy	207	Survey – multiple including Italy*	10
	EU Total	341	EU Total	451

**Assuming that approximately half of these submissions are not captured by the industry association data submissions e.g. Italy*

4.4 Opinion of industry on market impacts

This section summarises the opinion-based questions relating to the impact of the introduction of end-of-waste criteria on the scrap metals markets. In particular, survey participants were invited to respond to six questions within Section 4 of the industry survey relating to the quality, availability and price of scrap. Results have been split by sector type where some differences were noted. Responses by industry associations are categorised separately, as their answers - although there are fewer of them - usually represent a large number of members.

4.4.1 Quality of scrap

The first question relates to the general effect on scrap quality on the market, where five answers were possible. There were 174 responses to this question. Nearly half the participants felt that the implementation of end-of-waste criteria for scrap metals had led to an increase in the quality of scrap on the market (either a large or slight increase). Approximately 40 % felt that there had been no change, with a very small number feeling the quality had decreased. The rest were unsure (see Figure 73). In terms of the profile of answers between different sectors, some slight differences are observable (Figure 74); a greater proportion of participants from the scrap industry felt that the quality had improved compared to other sectors (steel/aluminium works, certification bodies) or associations. When interpreting these survey data, which originate to a great extent from Italian stakeholders, it should be highlighted again that in Italy, a similar system to EU Regulation 333/2011 existed since 1998, which also had similar quality criteria.

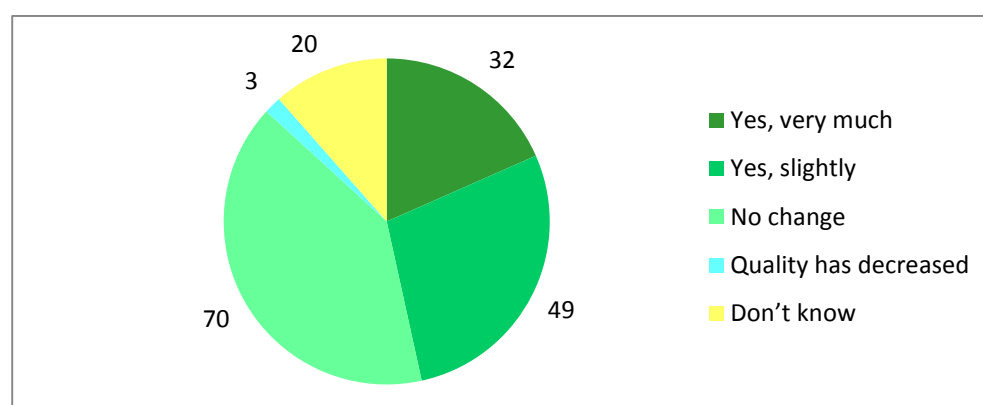


Figure 73: Has the quality of scrap on the market improved thanks to the implementation of end-of-waste scrap criteria? (174 respondents)

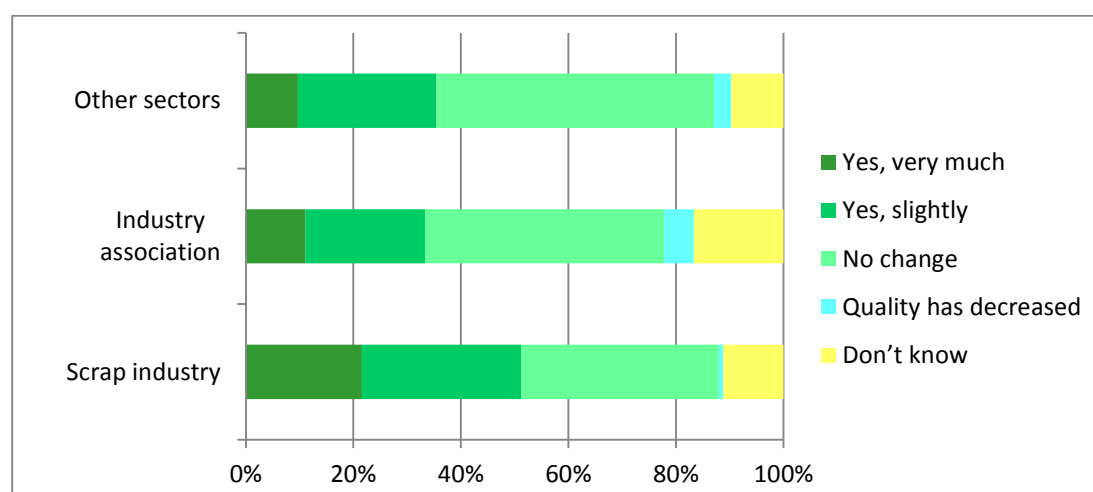


Figure 74: Has the quality of scrap on the market improved thanks to the implementation of end-of-waste scrap criteria? (125 respondents from scrap industry, 18 industry associations and 31 from other sectors)

In the next question, participants were asked their view on the main reason for an increase in the quality of scrap on the market (if they felt that the quality had risen), with five main responses possible. 86 responses were received to this question (Figure 75).

The two main reasons given for the increasing quality of scrap were: the strict rules introduced for compliance on the maximum contamination allowed, and that scrap producers have introduced quality management systems to get end-of-waste compliant status (31 companies both gave these as the main reason). Another reason commonly identified was that compliant scrap has followed strict treatment processes. A few participants did not know the reasons or felt that the quality increase was not due to the introduction of end-of-waste criteria.

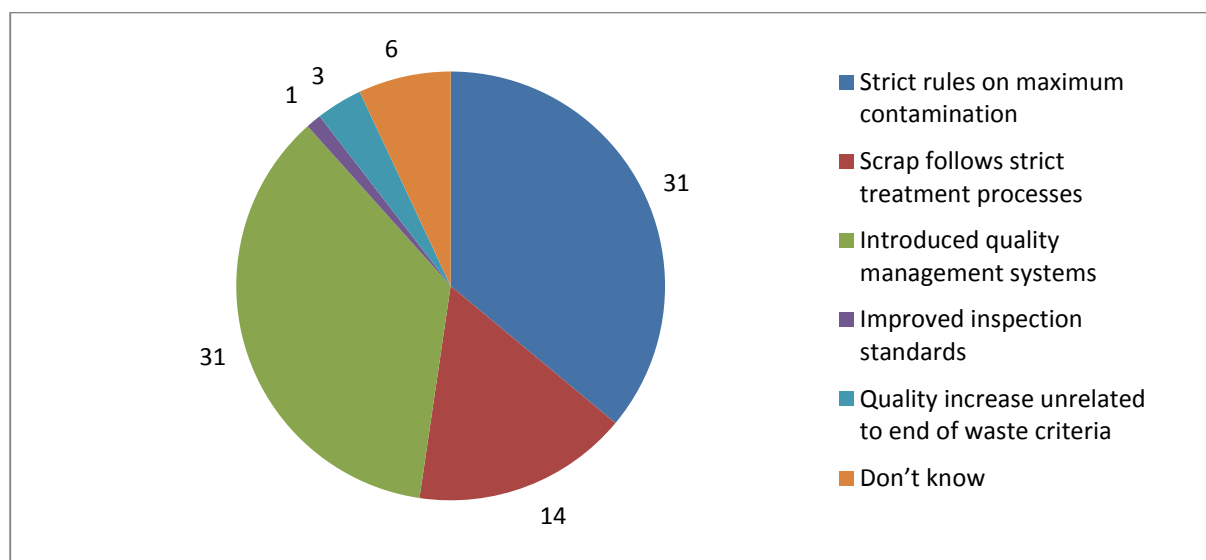


Figure 75: What do you think is the main reason behind an increase in the quality of scrap on the market? (86 respondents)

Finally, all participants were asked about how end-of-waste criteria have affected waste/non-compliant scrap. 169 responses were received to this question (Figure 76). Approximately 40 % felt that quality had increased, with a similar proportion thinking that there had been no impact. Quite a number did not know what impact there had been, and a few thought that the quality had decreased.

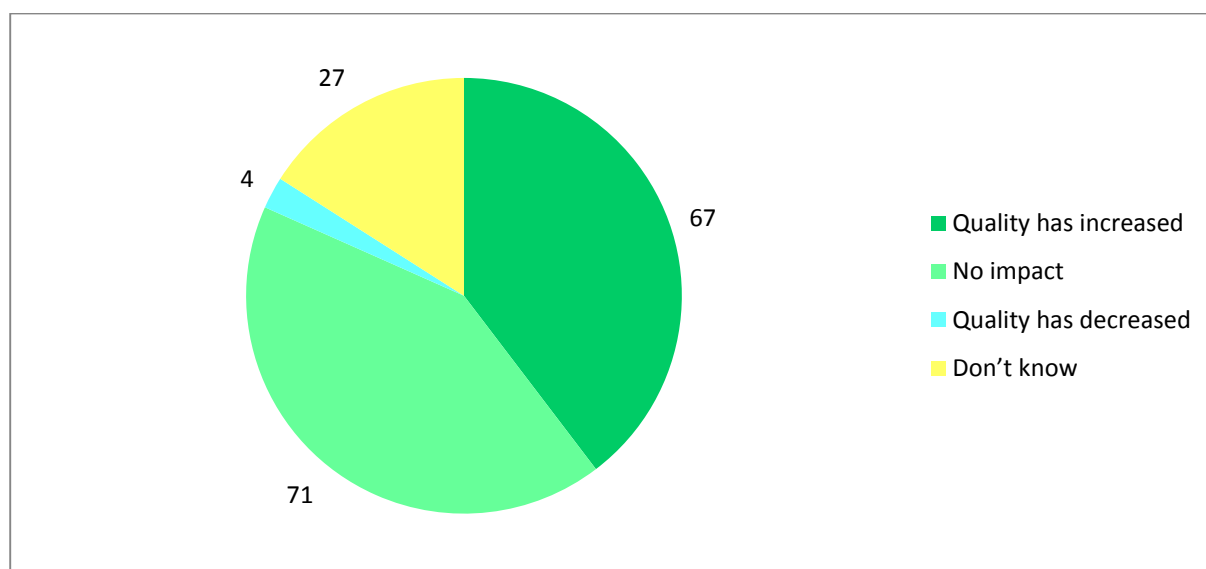


Figure 76: In your opinion or experience, how has the introduction of end-of-waste criteria impacted on the quality of waste/non-compliant scrap? (169 respondents)

4.4.2 Availability of scrap

The participants were next asked their view of the impact of the introduction of end-of-waste criteria on raw material availability (Figure 77). 165 responses were received to this question. Around 60 % of respondents felt that there had been no overall impact on the availability of scrap in the market. Around 10 % felt that the availability of scrap had increased following the introduction of end-of-waste criteria for scrap metals, with a similar proportion identifying that the raw materials availability of scrap had decreased. Quite a number of respondents were unsure of the impact.

In terms of the profile of answers between different sectors, some slight differences are once again observable (Figure 77). For instance, respondents from the scrap industry were much more likely to give the opinion that raw material availability was unchanged than were other respondents; whereas, among the other industries, including those that purchase scrap, a much higher proportion answered that the raw material availability had decreased following the introduction of end-of-waste criteria. Interestingly, industry associations were more likely to comment that end-of-waste had improved availability. These differences likely represent the different perspective of buyers and sellers in the transactions. Sellers of scrap, for example, might appreciate the new markets that end-of-waste may open up, while buyers of scrap may feel that this leads to a decrease in the availability of raw material.

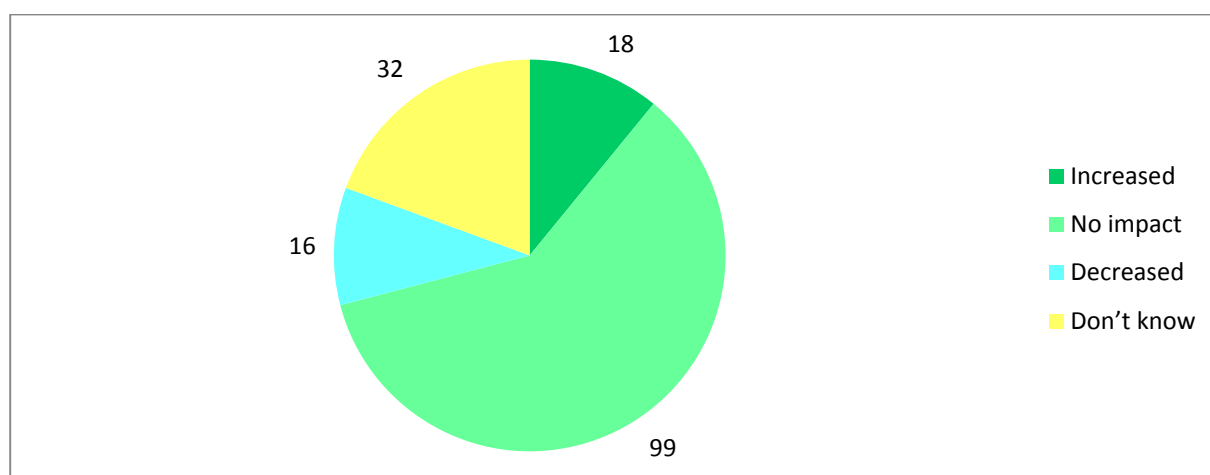


Figure 77: In your opinion or experience, how has the introduction of end-of-waste criteria impacted on raw material availability in the market? (165 respondents)

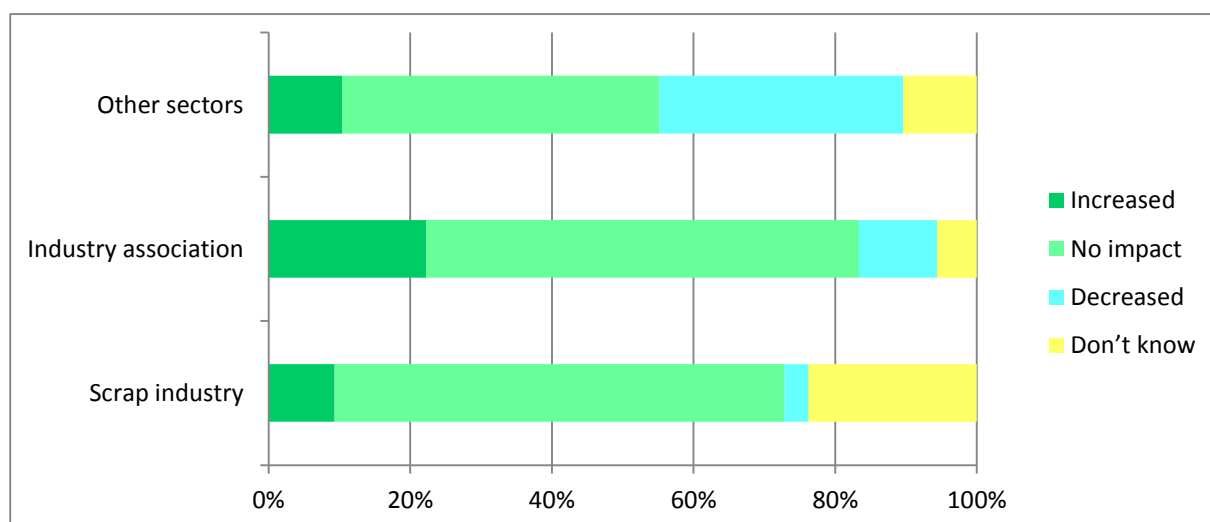


Figure 78: In your opinion or experience, how has the introduction of end-of-waste criteria impacted on raw material availability in the market? (118 respondents from scrap industry, 18 associations and 29 from other sectors)

4.4.3 Prices of scrap

The participants were then asked for their views on the impact on prices following the introduction of the end-of-waste criteria. The first question focused on the more general impact upon the prices of waste/non-compliant scrap, indicating their opinion on the magnitude of the impact within narrow price bands. 154 responses were received to this question (Figure 79).

Most respondents indicated that either they did not know what the impact had been on prices (40 %) or that there had been no overall impact on prices (33 %). Nearly all of the remaining respondents indicated that they felt prices had increased (25 %), although most felt that the magnitude of the increase had been quite small (0-2 % higher). Two felt that prices had fallen. Taken as an overall average, prices seem to have risen by around 0.7 % following the introduction of end-of-waste criteria for metal scrap, based on these survey responses.

Again, there are differences in opinions between actors. A greater proportion of the scrap industry respondents reported observing higher prices. However, some respondents in other sectors identified that, where prices had risen, the size of the increase had sometimes been quite large (Figure 80).

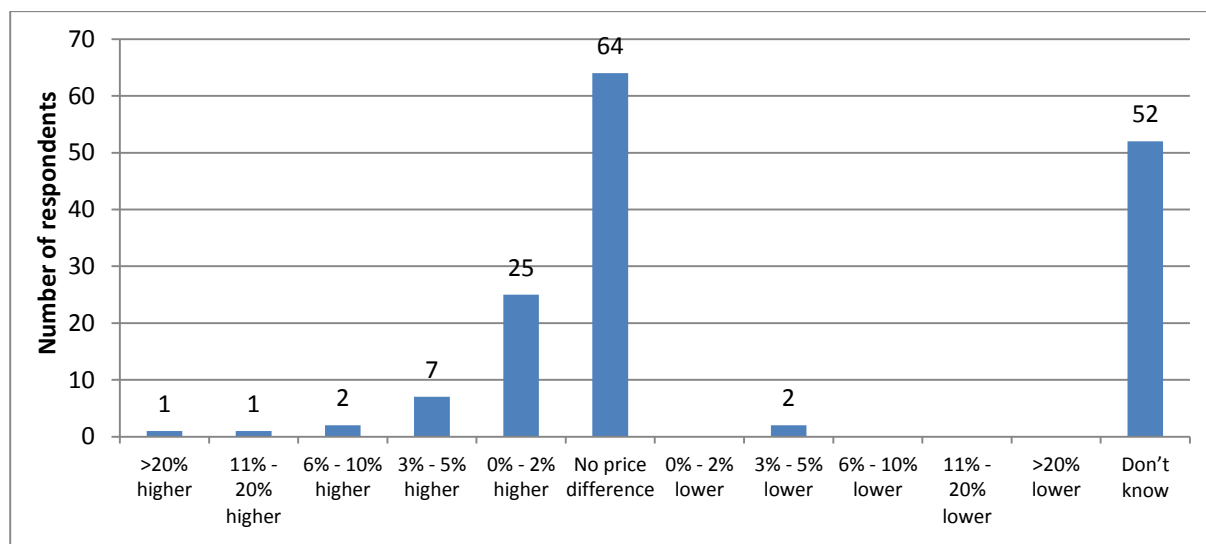


Figure 79: In your opinion or experience, how has the introduction of end-of-waste criteria impacted on the price of waste/non-compliant scrap? (154 respondents)

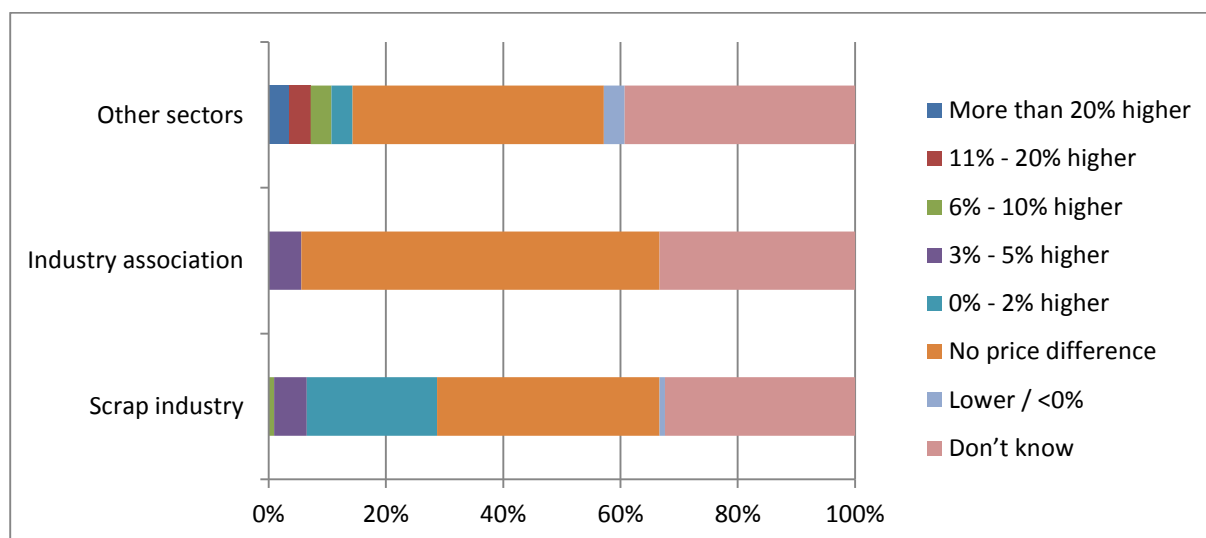


Figure 80: In your opinion or experience, how has the introduction of end-of-waste criteria impacted on the price of waste/non-compliant scrap? (108 from scrap industry, 18 associations, 28 from other sectors)

In the second question on prices, participants were asked their opinion on the price premium that can be commanded for end-of-waste compliant scrap compared to non-compliant scrap *of the same quality*. 153 participants responded to this question (Figure 81).

Most respondents indicated their answer as either “don’t know” (35 %) or “no price difference” (45 %). The remaining 20 % indicated that prices for end-of-waste compliant scrap do command a price premium over non-compliant scrap of the same quality. A number of these respondents indicated that the price premium can be quite large, with 12 % of the total survey indicating that the price premium exceeded 2 %. As an overall average the price premium is 1.1 % higher for compliant than non-compliant scrap, according to the survey responses.

In terms of the opinions from different actors, a similar proportion from the scrap industry and other sectors identified a price premium between compliant and non-compliant scrap (Figure 82). Noticeably, the scrap industry identified a smaller increase than the other sectors did.

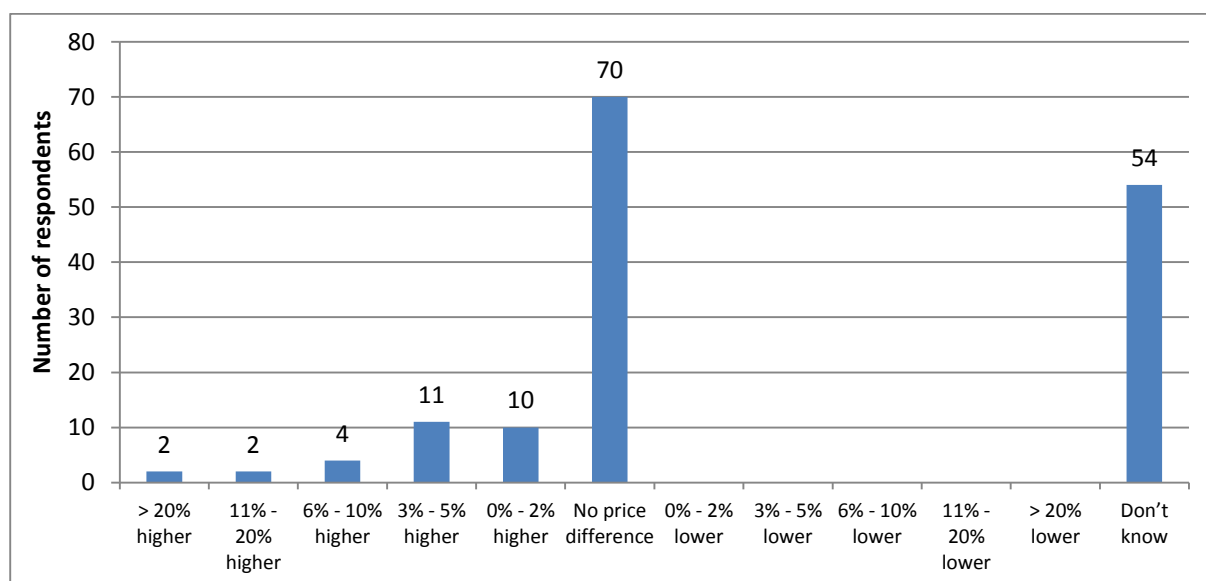


Figure 81: In your opinion or experience, is the current price of end-of-waste compliant scrap higher than non-compliant scrap of the same quality? (153 respondents)

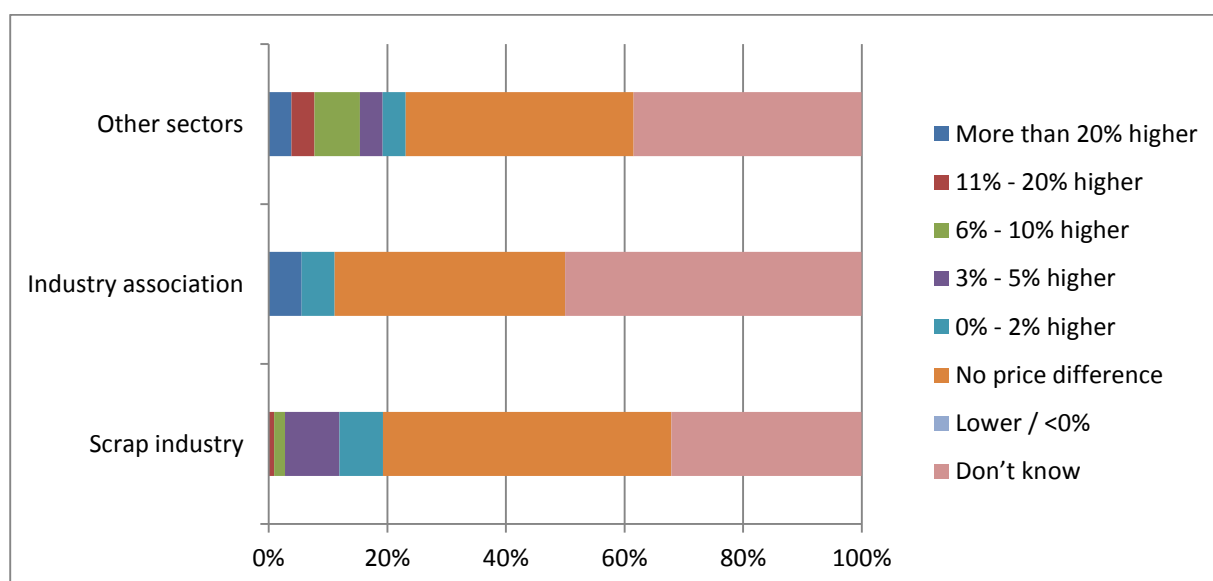


Figure 82: In your opinion or experience, is the current price of end-of-waste compliant scrap higher than non-compliant scrap of the same quality? (109 from scrap industry, 18 associations, 26 from other sectors)

4.5 Comments received from industry

All industry participants were invited to leave any additional comments on their experiences of the end-of-waste criteria for iron and steel and aluminium scrap. Approximately 60 industry participants provided further written comments.

The comments are presented below in full (with a suitable English translation where required). However, they have been grouped by theme and sector, scrap industry, industry associations versus other sectors (steel, aluminium etc.) to make them more easily digestible. The sector distinction is useful, as it brings out the different reflections of scrap sellers (scrap industry) and scrap buyers (other sectors).

Figure 84 provides a visual summary of the comments received from the industry, picking out key repeated words. Themes that are immediately apparent from this are: quality, criteria, material, export, treatment, increased/additional, Italy, environment and authorities.



Figure 83: Visual summary of the comments received from the industry survey

Note: “end-of-waste”, “scrap”, “regulation”, “Europe”, “333/2011” and “waste” have been excluded from the above figure due to their high frequency or triviality. Common words have also been removed and derivatives of words have been grouped together.

In general the following observations can be summarised from the comments received:

- There is quite a mixed picture of opinions by both the scrap industry and other sectors.
- Positive comments tend to focus on the improvement of quality, but negative comments focus on the cost impact (scrap industry) or the effect on availability (other sectors).
- Quite a large number of comments relate to the perceived limited impact of the regulation so far, particularly outside Italy, although differences in its implementation were noted.
- On the uptake in Italy, many of the comments suggest that end-of-waste has brought greater clarity and simplicity to the Italian legal situation by substituting for other existing regulations.
- A few very specific and more technical comments were provided that might inform a future revisiting of the end-of-waste criteria

4.5.1 Positive comments

The following generally positive comments were received about the end-of-waste regulations:

Scrap industry

"Regulation 333/2011 is necessary. However, it needs time to be implemented successfully, and to be trialled as a new system to improve our sales."

"I think this is very positive. It is a good measure which will improve companies. Implementation is slow because of the economic crisis and the lack of impact in price, but we have to continue this line of improvement for quality purposes. We should continue efforts for all metals in order to cover all product ranges of the company."

"We achieve a great product with a reduced administrative burden."

"The metal industry should see Regulation 333/2011 as a positive, not as a problem. This Regulation is essential, but it needs time to be implemented. We must continue introducing this type of regulation: it helps the recycling industry."

"This Regulation should be extended to all types of scrap metal."

Industry associations

"This Regulation is absolutely necessary, but it is a new concept and, as such, it needs time to be implemented. But it will be consolidated. Where it has been widely implemented (e.g. in Italy) it has been a success. It will facilitate scrap recycling, increasing recycling rates in Europe and thereby energy will be saved, emissions reduced and more jobs will be created."

This Regulation will be more important in the foreseeable future, ensuring quality scrap in Europe. It establishes common criteria across Europe thus levelling the playing field in all countries. It recognizes the key role of waste managers within the treatment and recycling chain. It is necessary to implement end-of-waste criteria in all metals and other waste. Metal works should see it as a positive matter not as a competition."

"We see the End-of-Waste Directive as having a positive impact as the scrap producer has to apply a quality management system and has to be verified by an accredited compliance assessment body. In the long run, this clause will improve the quality of the plants producing scrap."

Other sectors

"This Regulation has introduced waste treatment methods which are more conscientious."

"With the introduction of Regulation 333/2011 even scrap suppliers become aware of and bear more responsibility for the environment."

"Regulation 333/2011 introduces the requirement to have a quality management system, which results in a clear and explicit responsibility for suppliers of scrap metal to have regard for the environment and the quality of the material. This is a positive outcome which results in greater guarantees for the environment and quality. Where scrap is classified as waste, these responsibilities are placed on the end user of the scrap metal, i.e. the steel industry. "

"A positive outcome of introducing Regulation 333/2011 would be the opportunity to achieve more accurate measurement of scrap flows and better data on quality. Another effect could be that the measurement of and responsibility for radioactivity can be transferred to the early scrap generation and treatment part of the scrap flow. "

4.5.2 Negative comments

The following generally negative comments were received about the end-of-waste regulations:

Scrap industry

"It only resulted in substantial costs for our company."

"The burden of paperwork has increased for exporting scrap metal."

"This has created additional costs during a period of crisis. It only created advantages when the competent authorities starting undertaking serious audits. We hope that in the future such required changes will be better appreciated both by clients and by the authorities responsible for checking compliance."

"This is another 'white elephant' which is created by people who are completely unaware of the realities of our profession and the companies in this sector. They are putting in place regulations which favour large multinationals and which will decimate the large number of SMEs, the sole holders of know-how and sole creators of employment and investment."

"It increases costs and paperwork: waste sent to the steel and aluminium industry is of the same quality as end-of-waste scrap otherwise they would not be able to accept these materials."

"This has increased the administrative burden without achieving any improvements in the treatment of scrap. Not efficient."

"For our type of activity it makes no difference; in fact, it has resulted in additional costs and administrative burden."

"It's a waste of time, admin and money."

Industry associations

"Additional costs related to the end-of-waste status seem unjustified. Importantly, it should be noted that this Regulation is only applicable in Europe."

4.5.3 Limited impact

A number of participants felt that there had been limited impact to date from end-of-waste:

Industry associations

"In Italy, before the entry into force of Regulation 333/2011, scrap was already no longer classified as a waste after recovery operations also provided for by Regulation (operations were the same) and was delivered to Italian steelworks as a secondary raw material (i.e. no longer as waste). From an Italian point of view, it is therefore not surprising that the Regulation No. 333/2011 did not introduce new benefits to Italy, since the benefits were already provided at the domestic level by Italian legislation, since 1998."

Instead, the new Regulation has confirmed and consolidated the existing benefits, potentially extending them to all other recovery operators of Member States. This does not mean, however, that in Italy there was no need to replace the National Legislation with that of Community Origin, establishing, finally, at EU level, the opportunity to transform (recovering) scrap waste to a non waste, setting up the system of the end-of-waste through the appropriate Regulations directly applicable in all Member States of the EU: it was what we were hoping for so long."

Scrap industry

"This is a new concept and my customers (steel, copper and aluminium makers) need time to implement it and to not consider the end-of-waste criteria as a threat. I think that this new Regulation recognises the job of scrap dealers."

"Overall, nothing has changed. The administrative burden related to this regulation has increased, and conformity has been perceived as a requirement given it was not possible to carry on working without it."

"There have been no differences in the market between those who have adopted Regulation 333/2011 and those who continue to classify scrap as waste. The iron and steel industries do not take this difference into account."

"A system which has not solved the problem of distinction between waste and non-waste"

"From an economic/market point of view, nothing has changed as the steel industry was already structured so as to receive scrap which was no longer waste. In fact, foundries never invested in adapting their technology to receive waste due to a lack of sensitivity and strategic vision on this issue."

"There is little difference."

"As long as the final consumers do not demand end-of-waste material, we will not see any need for this legal process."

"It is not possible to find in the market organisations which will certify our quality system to comply with end-of-waste criteria."

"We haven't had enough experience because we are only recently certified."

Other sectors

"The current price of end-of-waste compliant scrap is unknown in the UK as no one is supplying or buying end-of-waste compliant scrap."

"Scrap has been always bought based on intrinsic quality and a new label does not provide any advantage for a recycling facility. The installation which recycles the steel is authorised for waste treatment. The steel recycling facilities meet the state of the art for emission control techniques following the requirements of the IPPC/Industrial Emissions Directive."

"The quantities of end-of-waste scrap are still limited compared to the total quantities of treated scrap, though probably they will rise in the future. The scarcity of scrap in Europe limits the choice: a refiner in some cases is obliged to buy what is available on the market."

"Scrap exporters sought end-of-waste status so as to avoid any tightening in waste export controls. It is not applied and is of no use in domestic sales. There is no control on scrap exports or check on whether they are compliant with end-of-waste status."

"So far as we are aware, take-up of the end-of-waste position has been close to nil. All scrap aluminium purchased by us is as waste and no supplier has offered us end-of-waste material. If the material was widely available and of good quality, there could be benefit through reduced administrative burden."

4.5.4 Differences

Some companies identified specific differences in the implementation of end-of-waste:

Scrap industry

“Every scrap trader interprets the regulations differently. This is particularly true for steel alloys. As there are no specific laws on this type of scrap, some people treat it as MPS and some as end-of-waste. This is true for materials such as Inconel and titanium and a number of other alloys.”

“Significant increase in required paper documentation for QMS - this creates anomalies between what is declared on the declaration of conformity required by the regulation and the acceptance by the final receiver of the EoW scrap (example: amount or type of scrap)”

Other sectors

“Our company has a panoramic viewpoint on the issue as our activities spread over areas with varying scrap markets and regulatory conditions. Our view is that, even though the End-of-Waste Regulation is not being applied homogeneously across the EU, it should be preserved in its current state.”

“As a matter of fact, the reason why scrap is not being purchased against the end-of-waste criteria in some countries is - among others - because its requirements are already being covered by purchasing specifications and local regulations (in particular as regards radioactivity). Where local authorities favour a more rigid approach and have to deal with overlapping local legislation, the End-of-Waste Regulation is used to set the scrap purchasing framework.”

“We support a flexible approach where the choice is left to operators and local authorities to apply the End-of-Waste Regulation to the most appropriate extent in relation with local scrap market conditions.”

4.5.5 Impact in Italy

Quite a number of participants provided comments specifically about the impact in Italy:

Scrap industry

“It is not possible to comment briefly on the entire environmental management system in Italy which, in our opinion, imposes strict laws (without having the proper human resources to offer the equivalent service to those companies which need to gain authorisation from these competent authorities and that are subjected to impolite treatment when being audited) but at the same time does not impose the same rules on the entire territory but only in some areas. Either way, there is a system in place but it is not able to manage the serious lack of information with regard to the actual working environment.”

“In Italy, the adoption of Regulation 333/2011 has simply resulted in a clearer legislative framework with regard to companies that were previously struggling with a complicated system, which suffered from contrasting interpretations and was applied differently throughout the national territory.”

“Italian laws regarding the recovery of scrap metals and the possibility of defining them as a secondary raw material are more stringent than the End-of-Waste Regulation. Therefore in Italy this Regulation simply results in an increased administrative burden.”

“Regulation 333/2011 has simply substituted for Italian legislation on secondary raw materials. To date, anyone trading these materials is already certified. We have never received end-of-waste scrap from outside Italy, even if the scrap was of the same quality as end-of-waste scrap: it seems as though this Regulation has not been adopted outside Italy.

I think the reason is waste laws are a lot more complicated in Italy compared to other countries, where they do not feel it is necessary to become certified. Furthermore, most Italian foundries are not authorised to receive waste and they have therefore required all their suppliers to become certified.”

Industry associations

"The application and the existence of Regulation 333/2011 are fundamental in Italy. Until its entry into force in 2011, the majority of metal scrap sold by waste treatment facilities to the steel and aluminium industry was already classified as 'secondary raw materials' in Italian law (since 1998) and no longer as waste, as the industry had limited capacity to accept metal waste.

For this reason, to ensure continuity and to provide market certainty, it is vital that the European end-of-waste legislation remains in force and is confirmed during the revision of these criteria and of Directive 2008/98/CE."

"Italian steelmakers have always complained of having a (5-10 %) more expensive scrap due to their limitations of not being able to consume this same scrap as if classified as waste."

Other sectors

"End-of-waste legislation in Italy is quite common today. Many aluminium scrap dealers strove to become certified and today they deliver scrap according to the end-of-waste criteria. In any case, an increase in the number of scrap dealers that operate according to Regulation 333/2011, or an increase in the quantity of end-of-waste scrap available, would be really positive."

"In Italy we do not currently receive end-of-waste scrap from non-EU countries, but we would accept it without any problem. Due to the End-of-Waste Regulation, EU refiners experienced a decrease in the amount of aluminium scrap available on the market, especially of high quality scrap.

Export of end-of-waste scrap is easier compared to other materials. A regulation that would control and steady these exports would be highly recommended in order to save the entire aluminium value chain at European level."

4.5.6 Impact elsewhere

A few comments were received on the specific impacts in other Member States from the other sectors:

Industry associations

"End-of-waste plays no role within Germany. The domestic steel scrap companies already operate under waste regulations. They deliver excellent quality scrap to suit the demands of their customers in steel mills and foundries. Nevertheless, end-of-waste is partly applicable to cross-border trade. To avoid the Waste Shipment Regulation and/or to fulfil recycling permissions in foreign countries (especially Italy), they classify waste as product."

"France has imposed the use of ISO 9001, as Europe does not ask for a specific quality management system in its end-of-waste criteria."

"The guidance issued on the implementation of end-of-waste regulations by England's Environment Agency and the Scottish Environment Protection Agency effectively makes the use of the criteria impossible to apply. The unwillingness of the UK steel mills to purchase end-of-waste scrap is also a disincentive to the widespread adoption of the criteria."

"In Italy, the number of authorised scrap recovery companies active in "producing" end-of-waste compliant scrap, fulfilling the criteria of Regulation 333/2011, is very high. Nevertheless, we believe that in the near future the total number of the scrap companies achieving end-of-waste compliance will see an increase across the EU.

So it's important to keep Regulation 333/2011, as with the other EoW Regulations, in force and improved in the whole EU. This means the EoW system has to be maintained within the future Framework Directive on Waste (as we know, actually the Directive 2008/98/CE is under revision)."

4.5.7 Quality

The following general comments were received relating to quality:

Scrap industry

"Application of Regulation 333/2011 has focussed attention on the final quality of treated scrap metal."

"The quality of scrap that we supplied previously was already of high quality, with less than 2 % contamination."

Industry associations

"The introduction of a binding quality management system to get end-of-waste status implies an explicit assumption of responsibility of scrap producers/suppliers both for environmental aspects and for quality of the material which will contribute to the spread of good practices along the supply chain, while the classification of scrap as a waste puts all the burden and responsibility on the final users only."

"Regulation 333/2011 simply requires a QMS based specifically on 'ad hoc' criteria and conditions provided for by the Regulation itself. The Regulation never mentions and does not claim that the QMS must be in according to ISO 9001 or ISO 14001. An example of this is Italy and what happened in the autumn of 2011."

Obviously, authorized scrap yards that had already achieved ISO 9001 or ISO 14001 QMS have been able more easily to adopt the QMS in accordance with Article 6 of the Regulation."

"The criteria in the annex of Regulation 333/2011 are less stringent than the requirements of the steel industry (e.g. they don't consider radioactivity nor hollow bodies). The steel industry does not use the scrap directly but runs additional checks as it is responsible for the final product it produces."

"The key point is the quality of scrap (composition, size ...); its legal qualification (product or waste) is of no interest, neither for the environment nor for public health."

"Furthermore, scrap complying with end-of-waste terms is of better quality and allows a more efficient recycling treatment."

"Price differences depend on the scrap grade and the additional treatment and the analytical burden necessary to meet the criteria. Discussions and experience with scrap dealers/trades show a minimum additional price of about 6 % for analytical burden only, if no additional treatment is necessary."

In case of additional treatment the price may increase much more than 20 %, according to comments by scrap dealers."

4.5.8 Exports

Quite a number of comments were provided specifically on the impact upon exports:

Scrap industry

"The only advantage it could have provided was ease of trade within Europe. But from this point of view Regulation 333/2011 has had very little uptake. Maybe some people within the industry don't even know this possibility exists. Some member states carry on importing/exporting according to the old Regulation EC 1013/2006. Even within our company, we only use 333/2011 within the Italian territory."

Industry associations

"Trade can be affected by many factors, including end-of-waste regulation. Detailed information and data on trade are very important when it comes to analysing the aluminium scrap trade. As mentioned before in the answers, between 2011 and 2012 there were a few notable movements in the trade of aluminium scrap. They need to be analysed with more detailed information on the type of scrap."

Also interesting in terms of trade are the data and information from countries such as Belgium, the Netherlands and UK where traditionally large quantities of scrap trade are reported. In the UK, for instance, from 2011 to 2012 a significant increase in the export of process scrap (44 %) and turnings (more than double the amount) to outside EU is recorded.”

“Regarding the impact of Reg. 333/2011 on ferrous scrap supplies and recycling markets and, in particular, the export of end-of-waste steel scrap outside the EU (extra-EU), the export of scrap is needed because the internal consumption at EU level will never be able to absorb the quantities available (domestic ferrous scrap) offered on the EU market.

In fact, it is well known that the European steel industry has always produced mainly from using iron ore and coking coal (primary steelmaking: blast furnace and/or blast oxygen furnace - BOF). This is why Europe is the second largest scrap exporter in the world after USA. The production of steel by remelting scrap [secondary steelmaking: electric-arc furnace (EAF) - ferrous scrap is the key input in EAFs], such as occurs in Italy, unlike other EU Member States, is in fact lower than in EU steel BOF and it is a peculiarity of only some Member Countries.”

“It should be noted (a very important fact) that exports of ferrous scrap from the EU to third countries are carried out in compliance with Regulations governing the Shipments of Waste, such as scrap still classified as waste (Green List waste accompanied by Annex VII of Reg. CE n. 1013/2006).

The ferrous scrap, only in rare cases, is exported from EU classified as end-of-waste. Therefore, the impact of Regulation 333/2011 on the export of ferrous scrap from the EU is, in practice, totally insignificant. Considering also that many non-EU countries accept incoming in their Customs, shipments of scrap are classified only and always as waste.”

“Since the standards output (criteria to obtain EoW compliant scrap) of Reg 333/2011 are much higher than the characteristics of the scrap that is still classified as waste, the Regulation constitutes a barrier to the export of scrap in general and not a route to greater efflux of scrap to countries outside EU.

In the case of the scrap aluminium; when exported to countries outside the EU, it is exported as waste according to Reg. 1013/2006 (as Green Listed waste with Annex VII) and not as end-of-waste scrap.”

“The scarcity of aluminium scrap in Europe is increasingly a problem for European aluminium refiners. The export of end-of-waste scrap is somehow easier for traders and, as using scrap also enables energy-saving in the production recycling process, it is likely that exports will increase in the future. A regulation to control export flows is needed to secure the raw material for the European aluminium recycling industry.

“Due to increased export, some companies have experienced a decrease in raw material availability on the EU market.”

“Metal scrap has been collected at a very high collection and recycling rate due to its high economic value around the world. In theory it is difficult to see the added economic incentive and value to the already efficient recycling system in terms of collection rate and quality. In reality, according to many companies, the EU market has experienced a decrease in scrap quality since the implementation of End-of-Waste Regulation due to the increased export of good quality scrap.”

“End-of-waste scrap of high quality is strongly sought after for export, therefore its availability in Europe generally decreases. The highest quality is exported; the lower qualities remain in the EU.”

Other sectors

“Through the provisions of this regulation, high grade aluminium scrap leaves and the worst scrap remains in EU. Secondly, these highest grades do not in any way comply with the end-of-waste criteria because there is no effective control or no control at all is applied in Customs.

It’s a big mistake to export energy in metal scrap format (5 % of energy is used to recover aluminium instead of importing primary aluminium ingot from the Middle East). Scrap dealers are happy

with the open door to export energy and some waste (if Customs, as is common, has no tools to check/control the end-of-waste criteria) and Europe becomes poor buying energy and metal (the result is the same in the end)."

"Spanish scrap dealers have increased their exports exponentially during the recent years of economic crisis. With refiners in a very weak position (payments and sales figures) many fragmenting mills have been installed (more than 12 in the last 3 years) which frag all kinds of low quality scrap (profiles/cuttings/ taint tabor...mixed scrap...) which are outside the specification of end-of-waste criteria, and export it.

That means aluminium scrap such as ZORBA is exported, with very low quality and at high prices mainly paid from Asia. The scrap dealer is exporting low quality under the guise of frag/high quality, and this is reflected in the market with a dramatic lack of scrap of all types."

4.5.9 Other

Finally, four very specific comments were received about operational matters:

Scrap industry

"Our company deals with shredding of end-of-life vehicles (ELV). We think it is necessary provide clarifications on the fact that the producer of end-of-waste (the shredder) has to demonstrate that the previous handler (ELV treatment) has applied a quality management system that ensures that all the treatments described in Article 6 of Directive 2000/53 have been carried out. How can the ELV treatment facilities demonstrate they have removed all hazardous wastes from the vehicles if they do not have any weighing systems? Does the shredder just have to buy the scrap from certified ELV treatment facilities?"

Industry associations

"Although the EU Waste Framework Directive and the End-of-Waste Regulations are coherent, it seems Member States have differences in interpretation and implementation of those, so that the end-of-waste coinciding with transfer can be at different points dependent on national legislation.

One would have thought the inclusion of the "upon transfer" concept would add clarity. But the late adoption of the idea may not have allowed sufficient time to test the concept of "upon transfer" in each Member State to see if that point can indeed be the exit of the scrap yard. If the upon transfer does not allow waste to cease to be waste at the exit of the scrap yard the economic benefits of transport as a product would be lost."

Other sectors

"Introduction of end-of-waste material on the market could create some confusion and practical problems for the steel mills scrap yards. A mixture of non-waste and waste material will appear on the yard which would be stored apart but mixed before charging the melting furnace.

Technically the material will be the same. Some contracted smaller suppliers would perhaps not choose to supply end-of-waste material. In this situation the steel mill has to choose whether or not to allow these suppliers to deliver, which would limit the scrap supply chain."

"We think a third party audit would be necessary half way through the three year period of application."

5 Analysis of impact on recycling markets

5.1 Key market trends

In conjunction with the information obtained from the results of the industry survey, a separate and independent analysis of existing datasets relating to scrap metals markets was conducted. This included datasets collected and made available by the key industry associations involved in this study, official statistics for waste generation and international trade from Eurostat and price data from specialist press (subscription to Metal Bulletin).

A varying level of detail is available on these quantitative indicators - such as on the data frequency, geographic detail and the number of categories/grades. At present, none of the available data distinguishes between waste and end-of-waste scrap, and there are differing levels of detail on each indicator. Nonetheless, this information provides an important cross-check with the results of the survey in which the opinions of industry operators were sought.

The first task in this data analysis is to establish the clear baseline relationships that are evident in the data. These include the strong correlations that are evident between the key variables. This is particularly important, as otherwise one might wrongly attribute to existing market trends the impact that may have followed from the introduction of end-of-waste criteria for scrap metals, which *ex ante* is expected could be relatively minor compared to other market trends.

5.1.1 Price movements

By far the largest event that is evident in scrap prices, production and trade is the impact of the world financial crisis that occurred during 2008-09. As shown in Figure 84, world steel production declined by a third from its mid-2008 peak of 120 million tonnes per month to around 80 million tonnes per month at the end of 2008. Steel scrap prices, such as for 'OA plate' and 'structural', exhibited an even larger fall in percentage terms, declining by over 80 % in just a six month period, although this price movement was just a correction back to pre-2008 levels, and prices have since recovered somewhat during 2010 (Figure 84). The correlation coefficient between world steel production and scrap steel prices is very strong at $r=0.856$. This relationship is not surprising, given the importance of scrap input to crude steel production. Similar price declines were also observable for aluminium scrap prices (Figure 85).

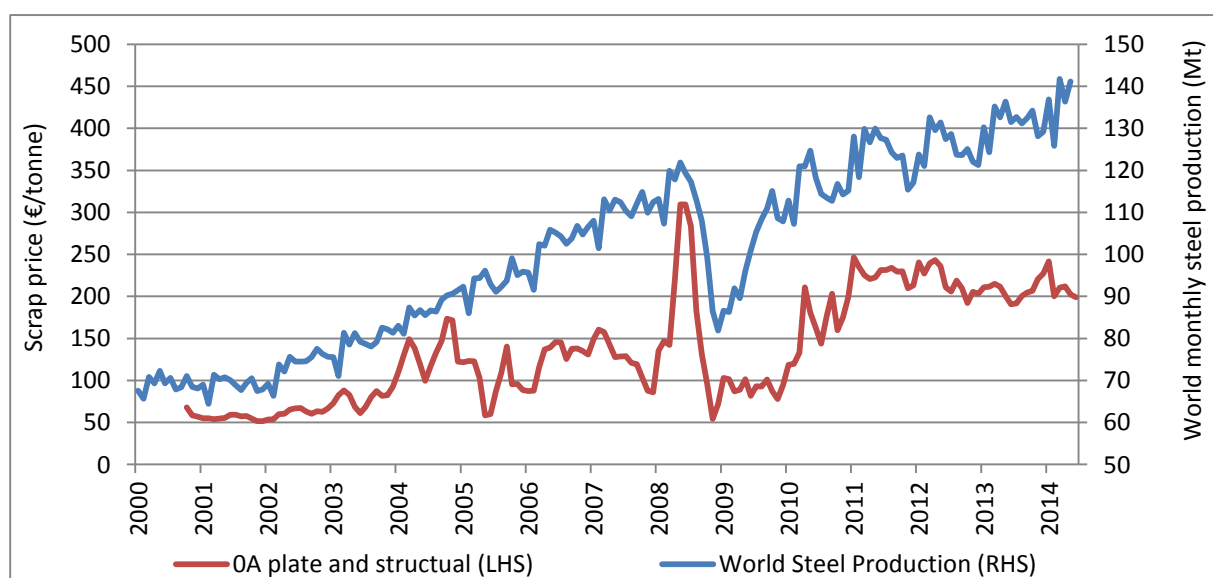


Figure 84: Trends in world steel production versus scrap steel prices, 2000 to 2014

Sources: Letsrecycle.com & World Steel Association [accessed July 2014]

There are also clear statistical relationships and correlations between scrap prices and primary raw materials. Figure 85 illustrates this for aluminium, which shows the price premiums between primary aluminium, aluminium cuttings scrap and primary alumina. In general terms, primary aluminium commands approximately a 20 % price premium over secondary aluminium cuttings. In contrast, alumina trades at around a 75 % discount to aluminium scrap. These price differences highlight the relative cost and quality of using each as a feedstock for producing aluminium ingots. Figure 85 also shows that there is a clear statistical correlation between primary aluminium and aluminium cuttings scrap and, with $r=0.853$, it is actually a stronger correlation than that between primary aluminium and alumina ($r=0.443$).

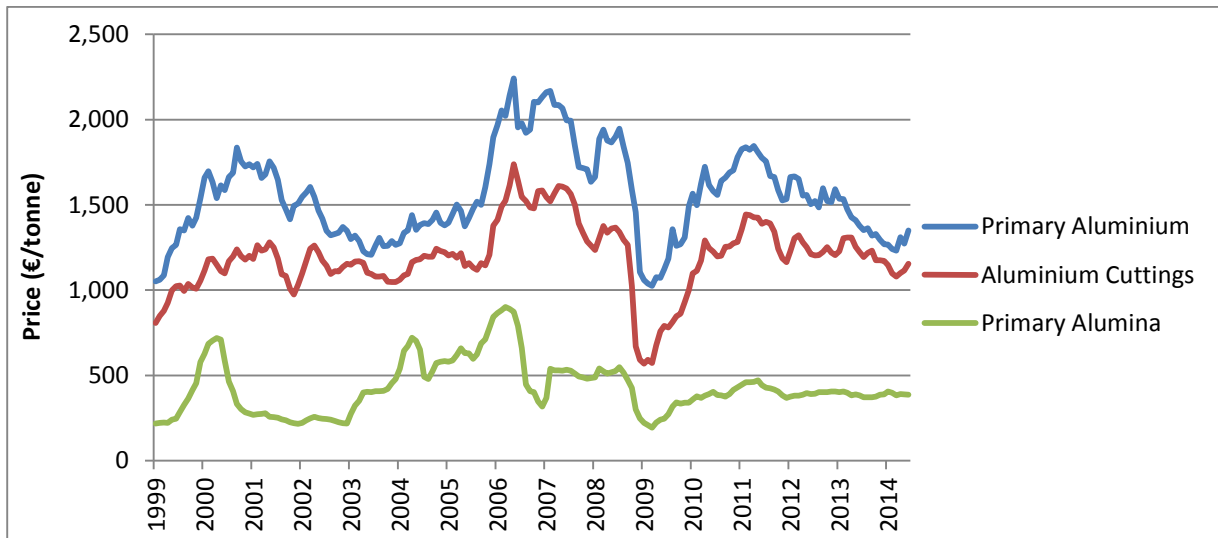


Figure 85: Trends in aluminium, scrap and alumina, 1999 to 2014 (€/tonne)

Source: Metal Bulletin Data

The statistical relationships between different grades of scrap and the LME primary aluminium price are clearly set out in Figure 86, below. Some high purity grades of aluminium scrap trade very close to the LME cash prices, including clean extrusion scrap and commercial cast. However, many post-consumer grades - such as old rolled baled - trade at a significant discount. Nonetheless the overall trends are similar: a large fall in prices at the end of 2008, before a partial recovery in 2009 and 2010, with a steadier period of trading since 2011.

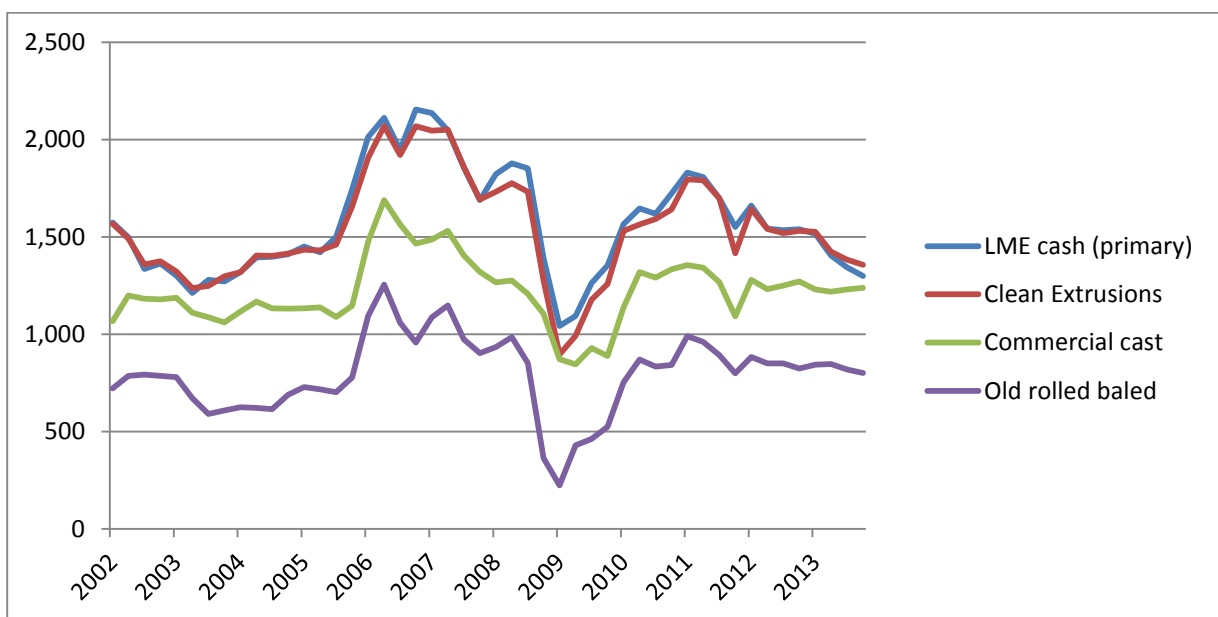


Figure 86: Typical Aluminium scrap prices vs. LME cash (€/tonne)

Source: Metal Bulletin Data

One interesting exercise is to compare scrap prices across different EU Member States. In particular, to compare Italian scrap prices, where there is a high level of uptake of the end-of-waste criteria, to other EU Member States where uptake has been more modest.

Within the Metal Bulletin database, separate EU Member State scrap price data is available only for aluminium scrap, and just for some specific grades. Figure 87 and Figure 88 show aluminium scrap prices for pure cuttings and commercial cast scrap. For pure cuttings there is little discernible difference between Italian scrap prices and those in France or Germany. For commercial cast scrap there is a common trend in prices, even if absolute prices are lower in France throughout, (presumably due to some differences in the specification of this grade in France). No discernible difference in trends can be observed after October 2011, following the End-of-Waste Regulation coming into force.

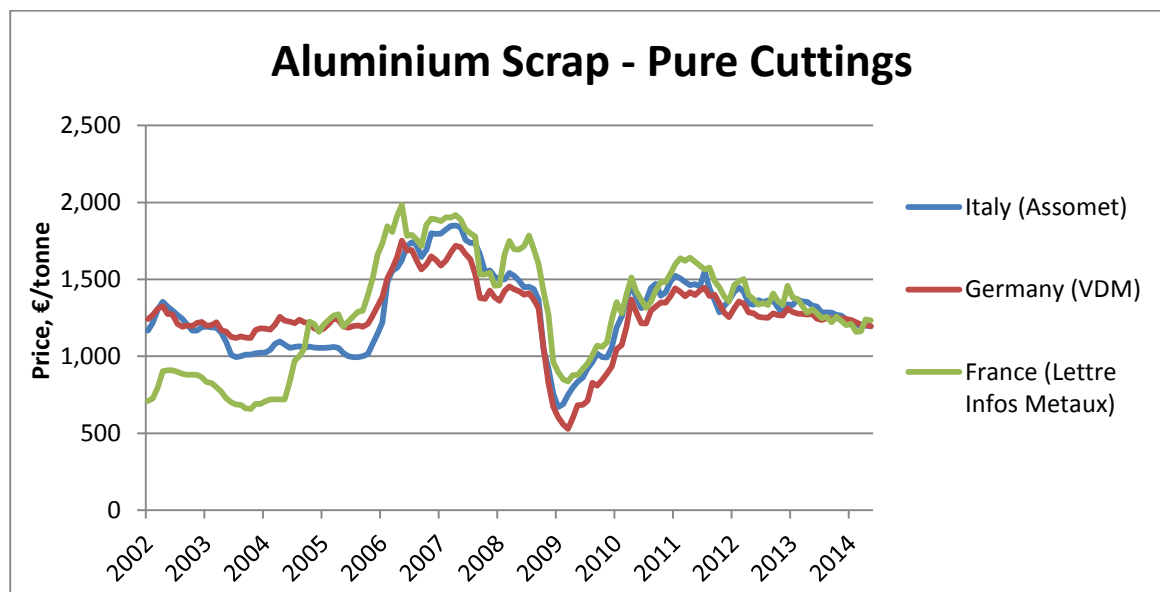


Figure 87: Aluminium pure cutting scrap prices across EU Member States (€ per tonne)

Source: Metal Bulletin

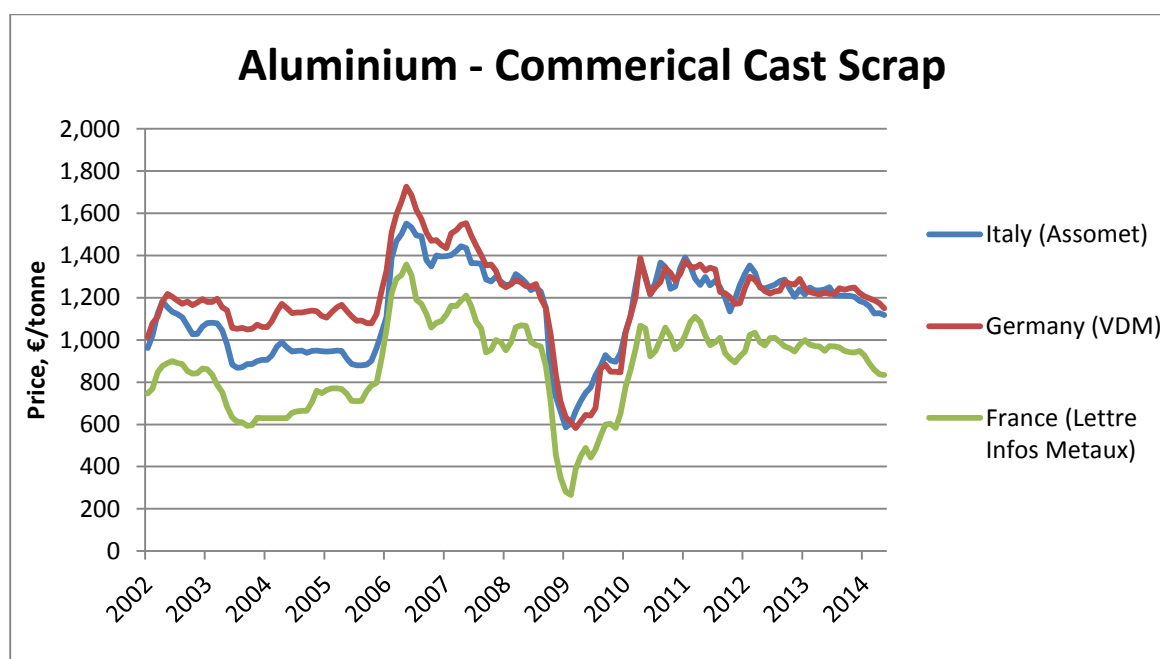


Figure 88: Aluminium commercial cast scrap prices across EU Member States (€ per tonne)

Source: Metal Bulletin

5.1.2 Trade volumes and destinations

The following pages provide a graphical summary of the trends in scrap metal since trade 2006.

Ferrous scrap trade

For ferrous scrap, there is a clear trend of an increasingly large net export balance. Figure 89 shows that EU exports of steel scrap rose significantly during the years of the global financial crisis, 2008-2010, following the large fall (-30 %) in European steel production during these years. Since 2010, the rise in the exports of steel scrap to outside the EU has levelled off, as European crude steel production has recovered somewhat. A similar trend is observable for EU imports of ferrous scrap.

The key message from this analysis is that the trends evident in the trade data - of rising EU exports and the net trade imbalance - started considerably before the introduction of the Regulation 333/2011 in October 2011. Therefore many of the concerns relating to the availability of scrap should not be attributed to the End-of-Waste Regulation for metal scrap.

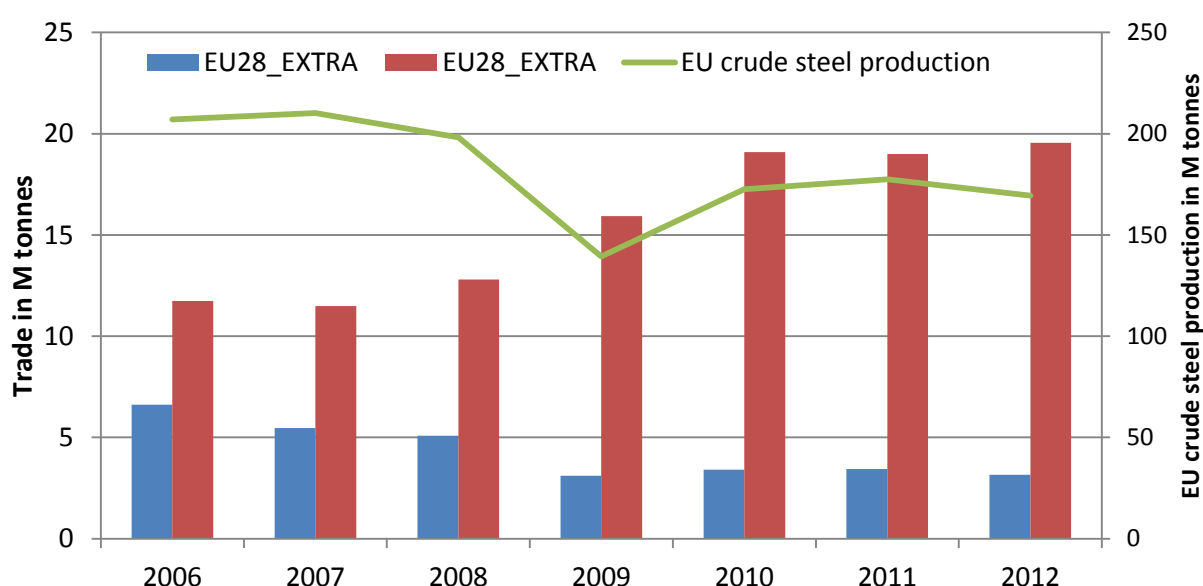


Figure 89: EU28 steel scrap (7204) balance from 2006 to 2012

Source: EUROSTAT (2013) and World Steel Association (2013)

A breakdown of the major destinations and sources for EU ferrous scrap is shown in Figure 90 and Figure 91 respectively. This shows that the rise in EU exports of ferrous scrap has been to OECD + EEA as well as non-OECD countries. On the EU imports side, most of the fall has been from non-OECD sources. Table 14 and Table 15 give the top five countries in each year for EU exports and imports (respectively) of ferrous scrap. These do not seem to vary much year-to-year. Further breakdown is provided using monthly data and by grade (Figure 92, Figure 93 and Figure 94). The data show significant seasonal variations.

Aluminium scrap trade

Data relating to the European import and export balance of aluminium scrap can be found in Figure 95, courtesy of CRU. This shows that Europe only started to become a net exporter of aluminium scrap in 2002. Before this, Europe was a modest importer to the tune of around 50,000-100,000 tonnes per year.

However, by 2009, European net exports of aluminium scrap to the rest of the world had reached 865,000 tonnes. This increasing trend for the net EU imbalance in scrap appears therefore to have started much earlier for aluminium than for steel, and again does not appear to be attributable to the introduction of Regulation 333/2011. Nonetheless, the graph does show the dramatic development in the trend for rising net exports of scrap aluminium outside of Europe.

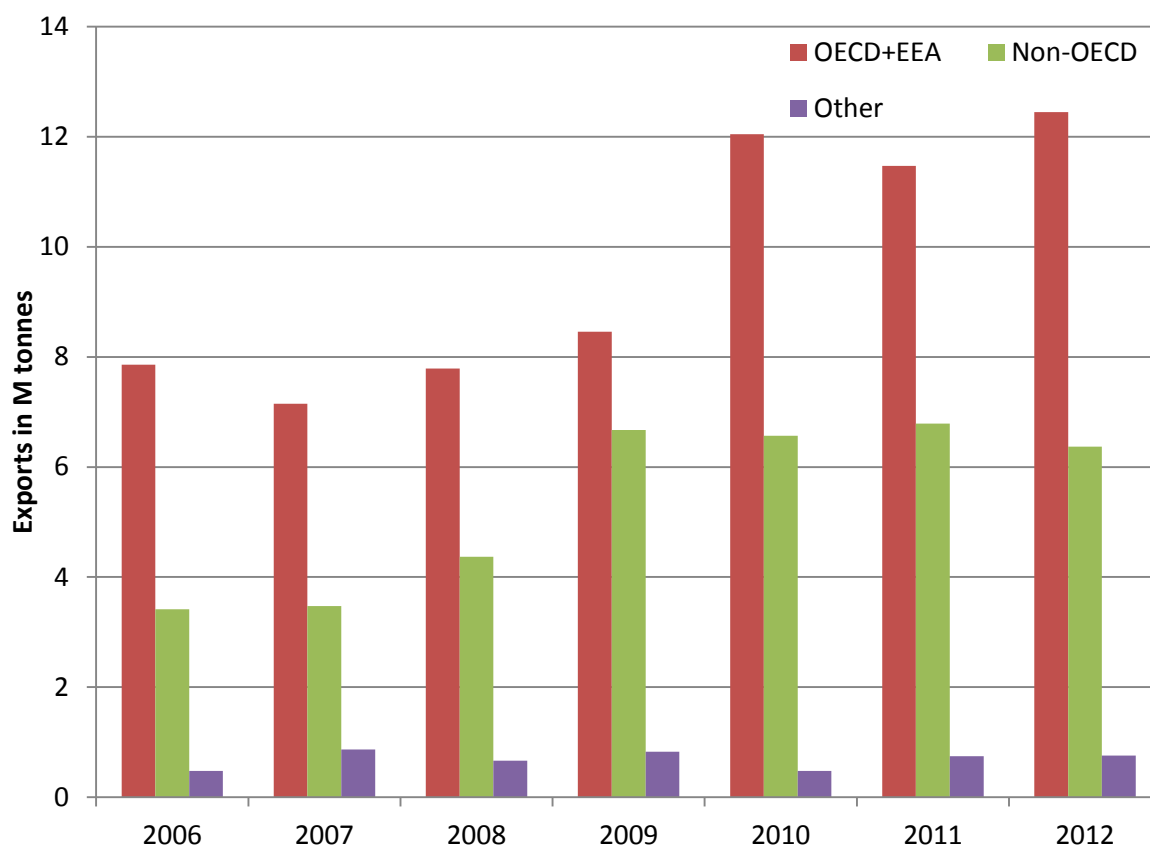


Figure 90: Destination of steel scrap (7204) exports from EU28 from 2006 to 2012

Source: EUROSTAT (2013)

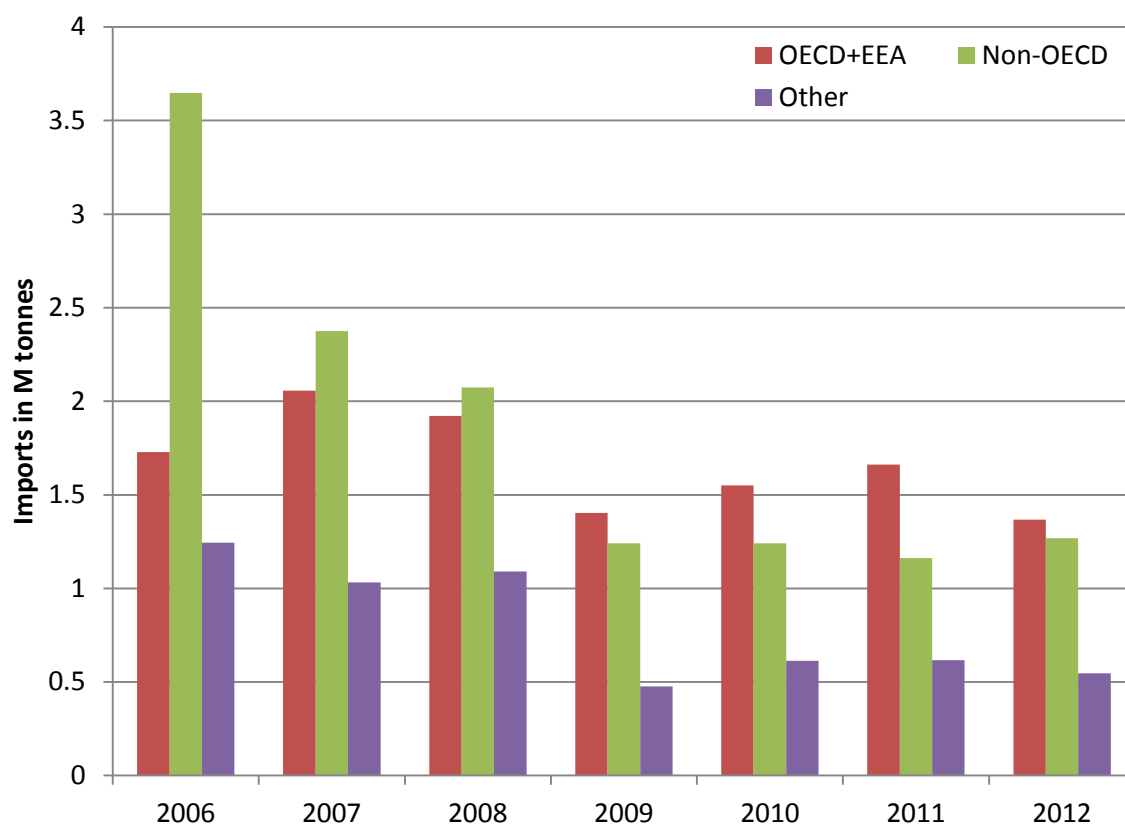


Figure 91: Origin of steel scrap (7204) imports into EU28 from 2006 to 2012

Source: EUROSTAT (2013)

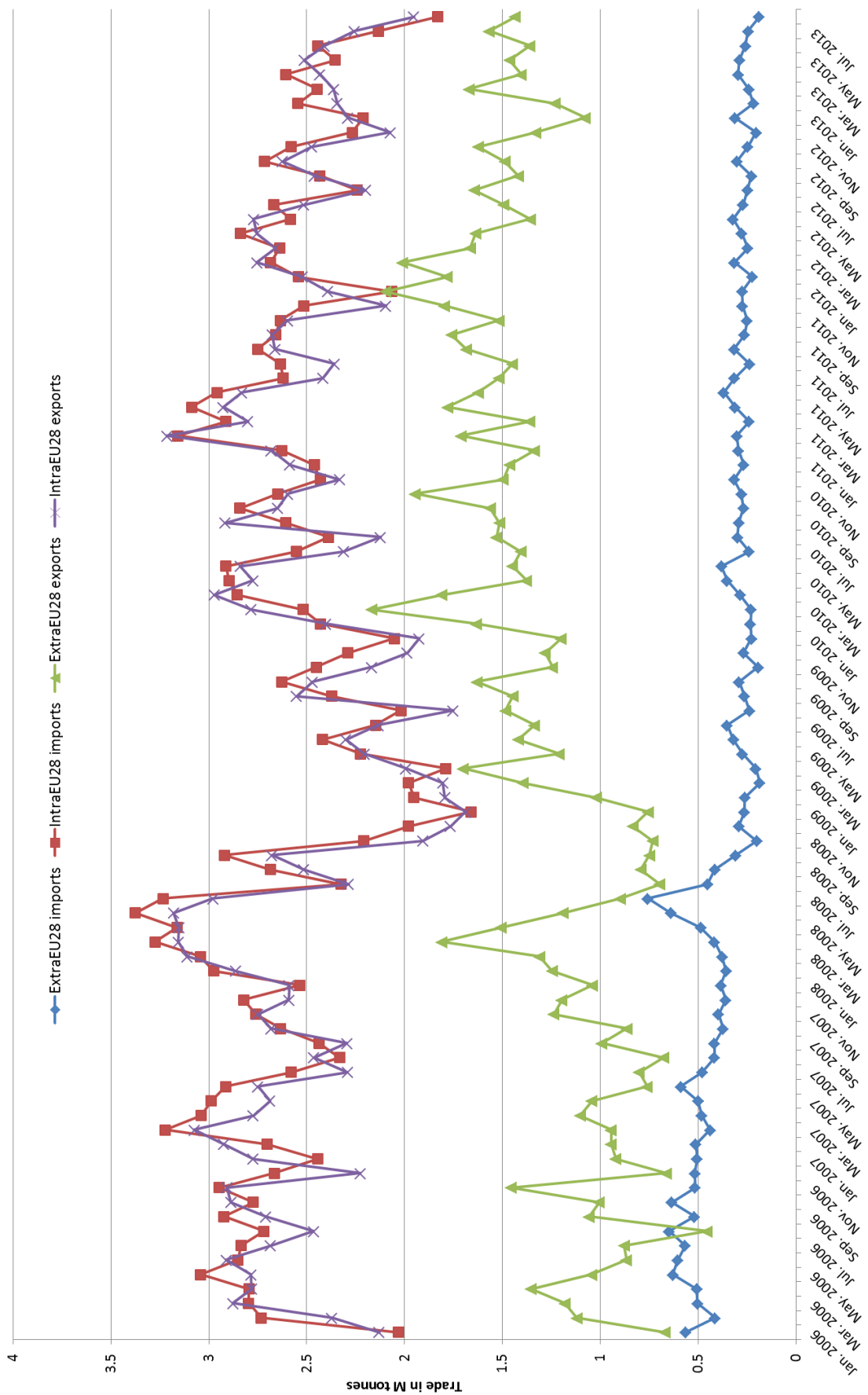


Figure 92: Intra- and extra-EU28 trade of steel scrap (7204) from January 2006 to August 2013
Source: EUROSTAT (2013)

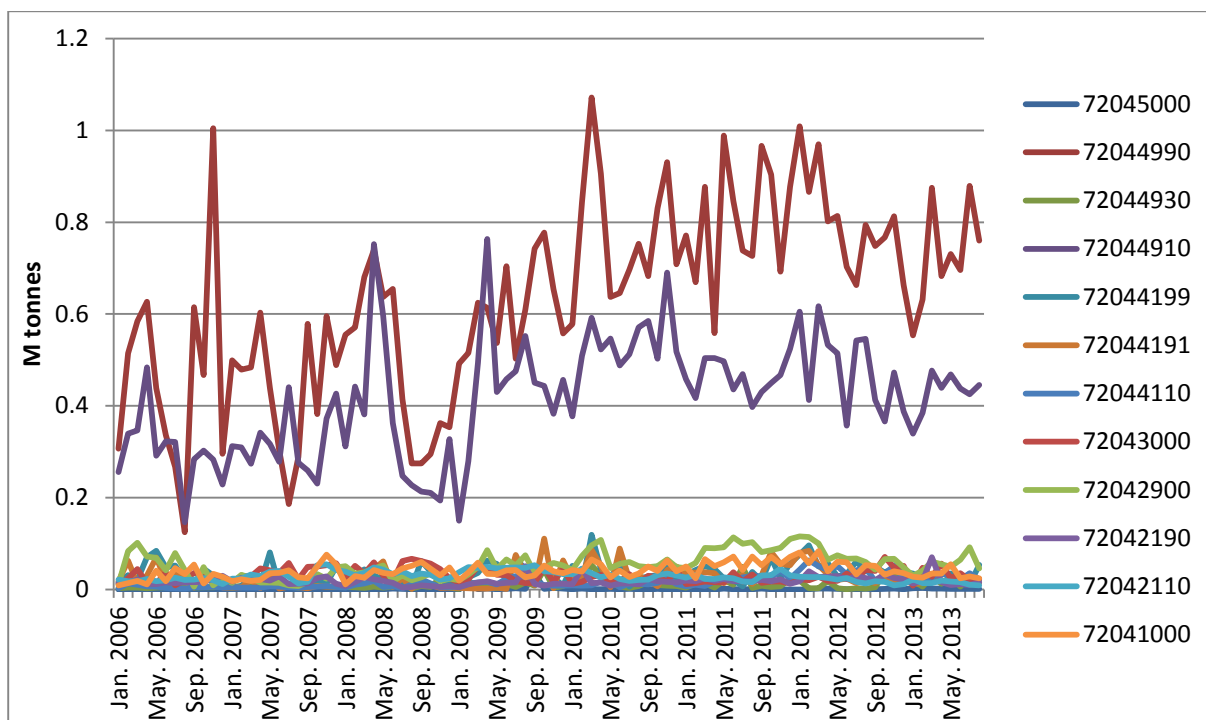


Figure 93: Extra EU28 exports by grade Jan 2006 to Aug 2013 (million tonnes / month)

Source: EUROSTAT (2013)

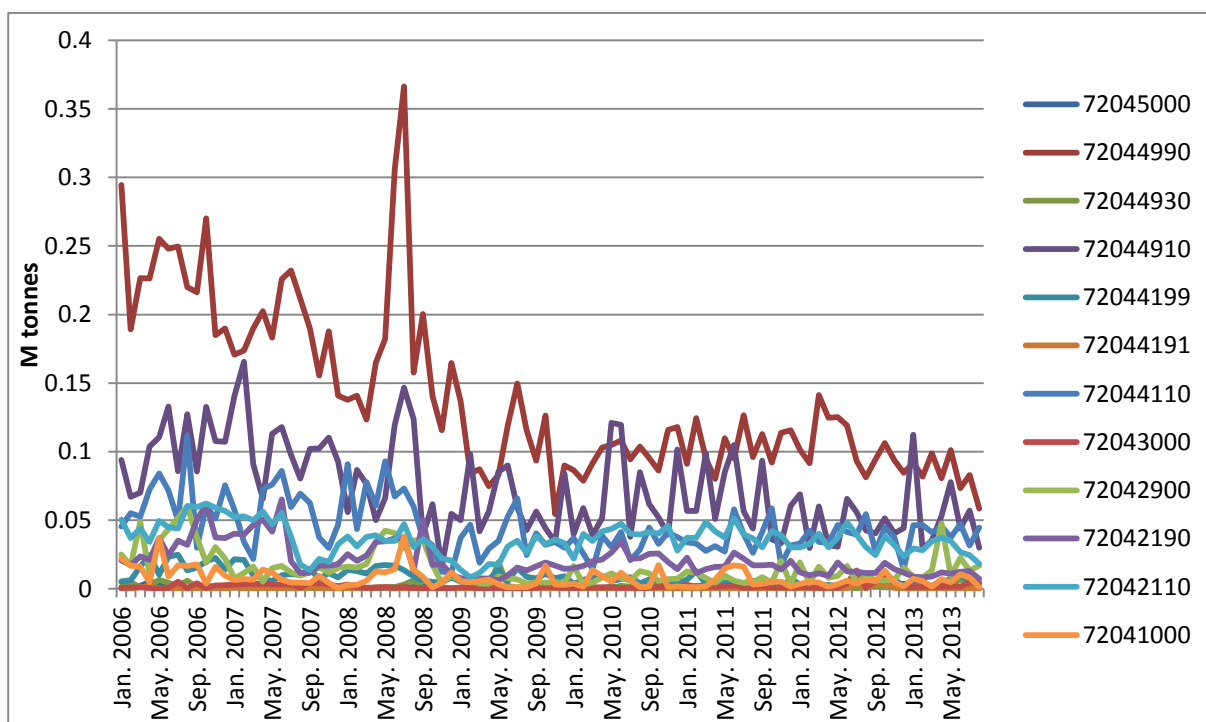


Figure 94: Extra EU28 imports by grade Jan 2006 to Aug 2013 (million tonnes / month)

Source: EUROSTAT (2013)

Key to trade commodity codes:

72041000 Waste & scrap, of cast iron

72042110 Turnings, shavings, chips, milling waste, sawdust & filings

72042190 Trimmings & stampings, of iron or steel, in bundles

72042900 Trimmings & stampings, of iron or steel, not in bundles

72043000 Waste & scrap of stainless steel, $\geq 8\%$ nickel

72044110 Waste & scrap of stainless steel, other

72044191 Waste & scrap of alloy steel

72044199 Waste & scrap of tinned iron or steel

72044910 Waste & scrap, fragmentised "shredded"

72044930 Waste & scrap, not fragmentised "shredded", in bundles

72044990 Waste & scrap, not fragmentised "shredded", not in bundles

72045000 Remelting scrap ingots of iron or steel

Table 14: Most significant export destinations for EU28 scrap from 2006 to 2012 (%)

	2006		2007		2008		2009		2010		2011		2012	
#	Country	%	Country	%	Country	%	Country	%	Country	%	Country	%	Country	%
1	Turkey	52	Turkey	54	Turkey	53	Turkey	47	Turkey	56	Turkey	54	Turkey	58
2	Egypt	11	Egypt	6	India	10	India	13	India	11	India	12	India	14
3	United States	9	India	6	Egypt	8	China	10	Egypt	9	Egypt	7	Egypt	7
4	China	4	Malaysia	5	Switzerland	4	Pakistan	4	China	3	China	4	China	3
5	Switzerland	4	China	5	China	4	Egypt	4	United States	3	Indonesia	2	Pakistan	2

Source: EUROSTAT (2013)

Table 15: Most significant import sources of EU28 scrap from 2006 to 2012 (%)

	2006		2007		2008		2009		2010		2011		2012	
#	Country	%	Country	%	Country	%	Country	%	Country	%	Country	%	Country	%
1	Russia	51	Russia	40	Russia	38	Russia	34	Russia	29	Russia	27	Russia	34
2	Kazakhstan	7	Kazakhstan	6	Kazakhstan	8	Norway	7	Norway	8	Norway	8	Norway	10
3	Norway	4	Norway	5	Norway	6	Kazakhstan	3	Canada	5	Canada	6	Kazakhstan	4
4	Macedonia	2	Canada	5	Macedonia	3	Canada	3	Kazakhstan	4	Bosnia and Herzegovina	4	Bosnia and Herzegovina	3
5	Algeria	2	Macedonia	3	Canada	2	Macedonia	2	Bosnia and Herzegovina	4	Kazakhstan	3	Serbia	3

Source: EUROSTAT (2013)

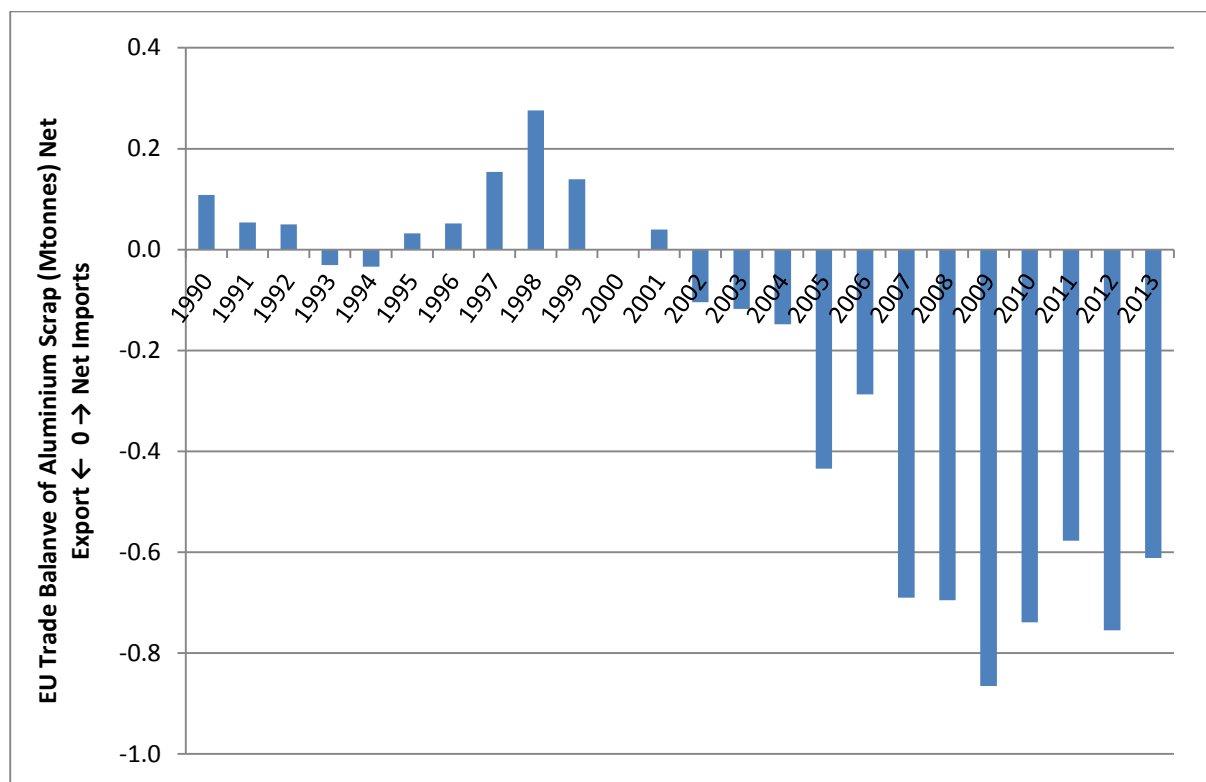


Figure 95: European import and export balance of aluminium scrap (000s tonnes)

Source: CRU

5.2 Quantitative analysis

5.2.1 Introduction

Following this review of the key market trends, a detailed quantitative analysis was conducted to investigate the impacts arising from the introduction of Regulation 333/2011.

The focus of the analysis of this chapter is whether and how the introduction of the End-of-Waste Regulation in October 2011 affected scrap metals prices in the EU. The data used for this analysis compares EU scrap metal prices for 2006 to 2013, to allow a before and after comparison of prices following the introduction of the End-of-Waste Regulation in October 2011. These results can be compared to the findings of the industry survey to check for consistency.

Price trends for EU scrap steel and aluminium are shown in Figure 96, with a dashed line showing the introduction of the End-of-Waste Regulation in October 2011.

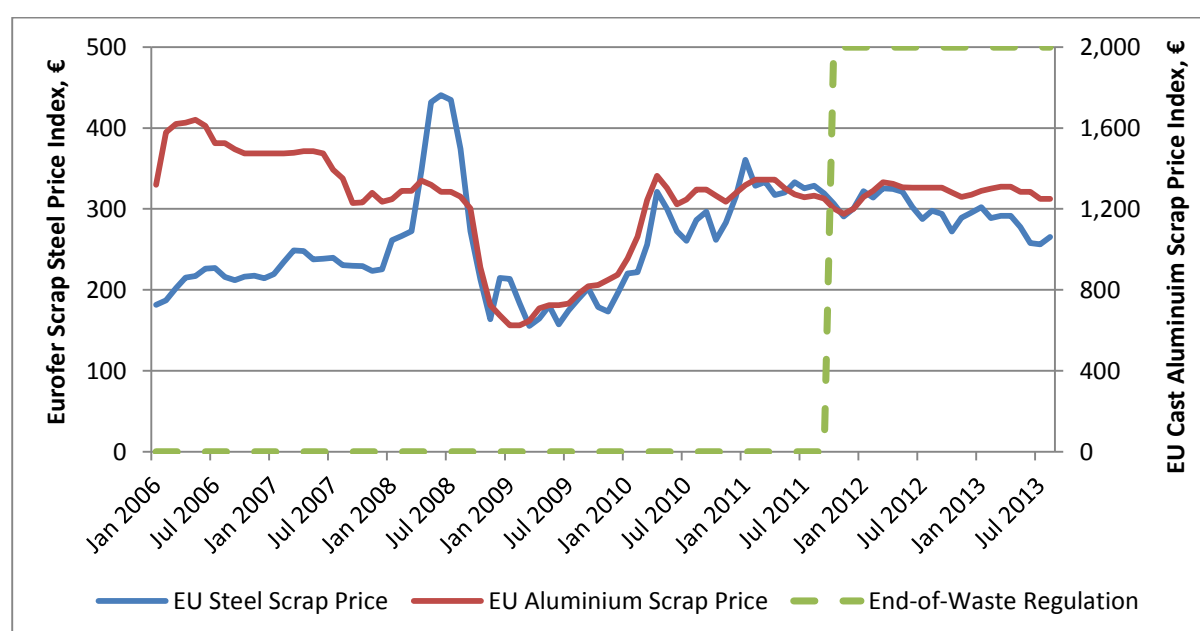


Figure 96: Price Trends of EU scrap steel and aluminium prices, 2006-2013 (€)

Sources: Eurofer for Steel Scrap Price Index and Metal Bulletin for Aluminium (Cast) Scrap Price Index

A simple analysis of average EU scrap prices shows that, for both scrap steel and aluminium, average scrap prices were higher in the period following October 2011 than the period preceding it (Table 16). For scrap steel, prices were more than 25 % higher in the second period than the first. For scrap aluminium, the magnitude of this increase is smaller, with a 6 % increase realised.

Table 16: Average scrap steel and aluminium prices, before and after October 2011, €

	Average Price Pre Oct 2011	Average Price Post Oct 2011	Average Price for 2006-2011
EU Steel Scrap Price Index	239	303	263
EU Aluminium Scrap Price Index	1,206	1,282	1,235

Sources: Eurofer for Steel Scrap Price Index and Metal Bulletin for Aluminium (Cast) Scrap Price Index

However, this type of analysis - whilst suggestive - is far from conclusive. A much more rigorous statistical approach is needed to confirm whether the introduction of the End-of-Waste Regulation in October 2011 has caused EU scrap metal prices to increase.

Correlation or causality?

In general scientific terms, there are three possible explanations that could be behind the possible link between higher EU scrap metal prices and the introduction of end-of-waste:

1. The introduction of end-of-waste has led to higher EU scrap metal prices (causal link).
2. Higher EU scrap metal prices led to the introduction of end-of-waste (reverse causality).
3. Other market conditions caused higher EU scrap metal prices, which happen to coincide with the introduction of end-of-waste (omitted variables).

Reverse causality

Of these three possible explanations, the reverse causality argument seems unlikely. The end-of-waste concept was first established in the Waste Framework Directive of 2008, first trialled in the IPTS report in 2009^a, and then finally introduced for scrap metals in October 2011. The timing of its introduction and the link with EU scrap metal prices would therefore seem to be quite incidental.

This is not to say that EU policy and regulation is never introduced because of market conditions.^b Rather it is to say that the main motivations for the introduction of end-of-waste criteria were to promote high quality recycling, reduce administrative burden, increase legal certainty and ensure the functioning of the internal market, while ensuring a high level of protection to the environment and human health. It is not possible to completely rule out the reverse causality argument, but for these reasons it seems unlikely.

Omitted variables

However, the other possible explanation needs careful examination. As this chapter has already shown, there have been many key market trends that have occurred during a similar period to the introduction of the End-of-Waste Regulation. Chief among them was the impact of the world financial crisis that occurred during 2008-09. Other important trends have been a sustained period of higher commodity and energy prices, and increasing export of scrap metal from the EU to the rest of the world.

Some of these trends took place before the introduction of the End-of-Waste Regulation, as shown earlier in the chapter. However, it is still essential to take into account a wide range of other market factors that may be driving higher scrap metal prices independently to the introduction of end-of-waste.

5.2.2 Multiple regression analysis – methodology and limitations

Overview

The approach taken here to better understand the apparent relationship between the introduction of the End-of-Waste Regulation and higher EU scrap metal prices is multiple regression analysis. This involved careful statistical analysis using SPSS software.

This approach attempts to control for all the relevant market factors and attempts to identify the impact of the regulation by comparing the period before its introduction to the period immediately after. This type of model is called trend-break analysis, as it is trying to determine whether the introduction of end-of-waste affected the observed trends in EU scrap metal prices. However, it should be noted that it will not be possible for the model to distinguish between the introduction of end-of-waste and any other market event occurring at the exactly same time in October 2011.

In developing this modelling approach we have followed the guidance of the following piece of economics/statistical literature that have modelled ferrous scrap prices: the study by Aylen J. and Albertson K. (2006), *Markets in ferrous scrap for steelmaking; Ironmaking and Steelmaking Vol.33*. That study sought to explain the major drivers for ferrous scrap prices including: production, trade and key input material and energy prices.

^a See EC JRC IPTS (2008), *End of Waste Criteria* & EC JRC IPTS (2009), *Study on the selection of waste streams for End of Waste assessment*

^b An example of this might be the “Action Plan for a competitive and sustainable steel industry in Europe” adopted by the European Commission in 2013, in response to challenging market conditions – see COM (2013) 407 for further details.

Key variables

The first stage in the analysis is to assemble a dataset with all of the key variables that may influence EU scrap metal prices, in addition to introduction of end-of-waste.

The main variable of interest chosen for the ferrous scrap price model was the Eurofer Scrap Price Index. This was chosen as a broad indicator of price changes across the whole spectrum of scrap grades. It represents EU-wide prices aggregated from averages across France, Germany, Italy and the UK. It was regarded as a good basis for modelling the overall scrap price for ferrous metals across Europe and avoided some of the inconsistencies of attempting to model country-specific data.

No equivalent price index variable is produced by the European Aluminium Association. Therefore the Metal Bulletin index for European aluminium cast scrap was selected as the main variable of interest for the aluminium scrap price model, on the basis that it would be representative for the EU as a whole, and because cast aluminium scrap is a common, but mid-priced scrap grade.

The full list of other variables considered for the models are shown Table 17 and Table 18. The broad subset of explanatory variables includes the following aspects:

- world and EU production of steel and aluminium (000s tonnes)
- import and export scrap to and from the EU (000s tonnes)
- key input raw materials for primary production e.g. iron ore and alumina (€/tonne)
- sea freight prices for the cost of international trade (€/tonne)
- key energy sources for production e.g. coking coal, natural gas, electricity (€).

As can be seen, this dataset has been sourced from a wide variety of reputable sources. All of these variables were converted into equivalent units, notably converting all currency units into euro, from their respective US dollar and other denominations, using historical market exchanges rates.

In addition to all of these variables, dummy variables (0-1 indicator variables) were created:

- for the month of the year – to account for the seasonality of the data
- for the year considered – to account for any further time trends present

Table 17: Variables considered for inclusion in ferrous scrap price model

Variable	Units	Data Source	Motivation for inclusion
EU Scrap Steel Price	€, Index	Eurofer	Main variable of interest
Introduction of EOW	Dummy variable at October 2011		Main variable of interest
World Crude Steel Production	000s tonnes	World Steel Association	Link to world demand for steel scrap
EU Crude Steel Production	000s tonnes	World Steel Association	Link to EU demand for steel scrap
Extra-EU Scrap Imports	000s tonnes	Eurostat-Comext	Link to EU availability of steel scrap
Extra-EU Scrap Exports	000s tonnes	Eurostat-Comext	Link to EU availability of steel scrap
Iron Ore Price	€/tonne	Metal Bulletin	Key raw material for primary steel production
Coking Coal Price	€/tonne	Eurocoal	Key raw material/energy source for primary steel production
Natural Gas Price	€/mmbtu	World Bank	Energy source for secondary steel production
Sea Freight Price	€/tonne	Eurocoal	Link to the cost of international trade
Electricity Price	€ cents/kWh	International Energy Agency	Energy source for secondary steel production

Table 18: Variables considered for inclusion in aluminium scrap price model

Variable	Units	Data Source	Motivation for inclusion
EU Scrap Aluminium (Cast) Price Index	€/tonne	Metal Bulletin	Main variable of interest
Introduction of EOW	Dummy variable at October 2011		Main variable of interest
World (Primary) Aluminium Production	000s tonnes	World Aluminium	Link to world demand for aluminium
European (Primary) Aluminium Production	000s tonnes	World Aluminium	Link to EU demand for aluminium
Extra-EU Scrap Imports	000s tonnes	Eurostat-Comext	Link to EU availability of aluminium scrap
Extra-EU Scrap Exports	000s tonnes	Eurostat-Comext	Link to EU availability of aluminium scrap
Alumina Price	€/tonne	Metal Bulletin	Key raw material for primary aluminium production
Sea Freight Price	€/tonne	Eurocoal	Link to the cost of international trade
Natural Gas Price	€/mmbtu	World Bank	Energy source for secondary aluminium production
Thermal Coal Price	€/tonne	World Bank	Energy source for (Chinese) primary aluminium production
Electricity Price	€ cents/kWh	International Energy Agency	Energy source for secondary aluminium production

Key challenges in the methodology

There were a number of key challenges to overcome in implementing this multiple regression methodology. These challenges included at least the following aspects:

- ensuring that a sufficient number of explanatory variables were included (omitted variable bias)
- avoiding over specifying the model by including too many variables
- dealing with the high cross-correlation of the explanatory variables (multicollinearity)
- correcting for the underlying seasonality in the data
- accounting for key trends occurring over time (autocorrelation and non-stationarity).

Including the right variables

The first two of the challenges were mitigated by producing various iterations of the final model across the wider set of explanatory variables. The final models were the product of many different iterations that produced less robust models. These versions were rejected either because they contained coefficients that were not statistically significant or because of their inability to explain sufficient variation in the EU scrap price indices.

Formal statistical tests were carried out to exploring the extent to which different variables, once entered into the model, improved its explanatory power. These statistics included:

- “Goodness-of-fit”, as measured by the adjusted R-squared statistic. This measures the proportion of the variation in the EU scrap price that is explained with the included variables. It ranges from zero to one, with a score near to one showing that the goodness-of-fit of the model is high.
- “Statistical significance”, as measure by t-statistics for each of the variables included within the model. A variable is said to be statistically significant to the model if the ratio of the estimated regression coefficient is large relative to the standard error of this estimate.

Despite these efforts, it cannot be guaranteed that all of the key relevant variables have definitely been included, particularly during a period of such strong market turbulence. Furthermore, it is not possible for the model to distinguish between the introduction of end-of-waste and any other market event occurring at the exactly same time in October 2011.

Dealing with multicollinearity

The issue of a high cross-correlation between the explanatory variables (multicollinearity) is a slightly trickier problem to solve. Essentially it means that the explanatory variables overlap, meaning that it is difficult to determine which one is driving the model. An example is shown in Figure 97, where the scrap steel price is shown to be highly cross-correlated with the coking coal price and the iron ore price.

The consequence of multicollinearity is that it affects the precision of the regression estimate, i.e. it misleadingly inflates their standard errors. It does not bias the model, but it does mean that the coefficients are much less likely to be significant. The easiest solution to this problem is to drop one or more of the highly correlated variables from the model. Formally, one can measure and use the degree of cross-correlation as a guide to constructing the model, or can detect and test for multicollinearity using the variance inflation factors (VIF) score.

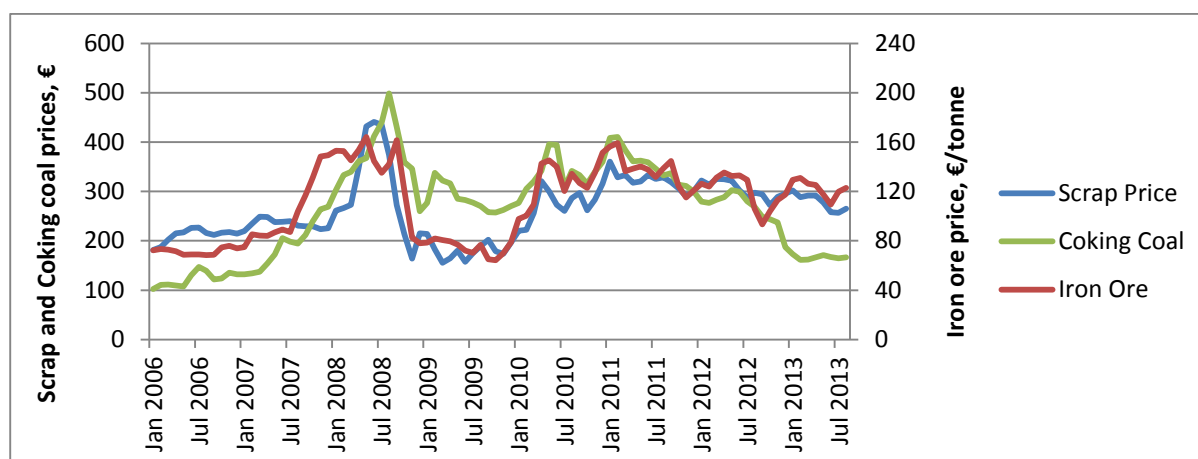


Figure 97: Trends in scrap steel, coking coal and iron ore prices, 2006-2013

Sources: Eurofer for Steel Scrap Price Index, Eurocoal for Coking Coal Price and Metal Bulletin for Iron Ore Price

Dealing with seasonality

The models constructed in this study almost exclusively use monthly data. This has the advantage of having more data available and being able to accurately pinpoint the introduction of the Regulation. However, a major disadvantage is that monthly data introduces additional variation into the model: namely seasonality. The seasonality of the data is illustrated in Figure 98, which shows the EU scrap aluminium price with imports of scrap. The data series are clearly correlated, i.e. scrap imports could be an important explanatory variable in the model. However, this volatility could affect the performance of the model. This is corrected here by including dummy variables – one for each month of the year.

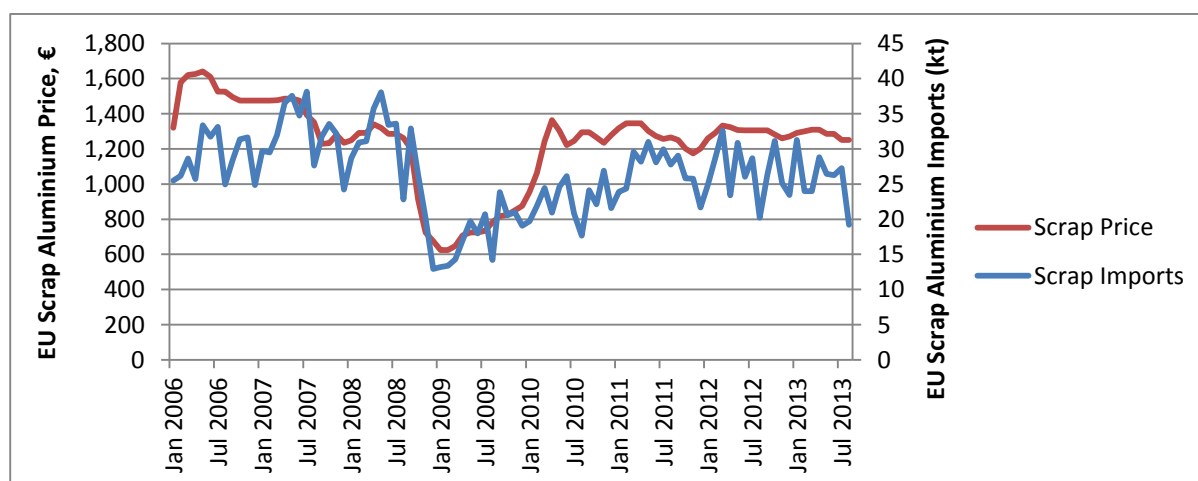


Figure 98: Trends in the EU scrap aluminium price and scrap imports, 2006-2013

Sources: Metal Bulletin for Aluminium Scrap Price and Eurostat-Comext for trade data

Time series data

Within the limitations of the modelling approach and the SPSS software used, less can be done to mitigate the time series concerns of autocorrelation and non-stationarity. A thorough time series analysis could be conducted, using specialist time series software.

Autocorrelation, also known as serial correlation, is where there is a degree of persistence (either positive or negative) in a data series between one period and the next. As with multicollinearity, autocorrelation does not bias the model results. However, it does mean that the regression coefficients are not efficiently estimated, so that their standard errors are large, and therefore the coefficients are less likely to be statistically significant. A formal statistical test, the Durbin-Watson statistic can be conducted.

Stationarity occurs in data series where parameters such as the mean and variance do not change over time or follow any trends. If this is not satisfied, it could mean that the results that two time series appear to be correlated when there is in fact no causal relationship. Without proper control, this can lead to spurious results. Economic variables (such as production) are often non-stationary, because they usually show a (rising) trend over time. This is certainly the case for world steel and aluminium production over the long run. However, for the price variables it is less of a factor. Formally, one would try to detect non-stationarity using a unit-root test; however, SPSS does not include this functionality.

To correct non-stationarity one could first difference the data, i.e. to remove the trend. An alternative approach that was used here is to include time period dummy variables e.g. one for each calendar year or to include a linear time trend variable. However, the disadvantage of this approach is that these dummy variables will be closely correlated with the dummy variable for the introduction of the End-of-Waste Regulation, and hence will mask some of the effect measured by that regression coefficient.

5.2.3 Multiple regression analysis – results

Ferrous scrap model

From calibrating the ferrous scrap baseline model, three main explanatory variables were kept in addition to the end-of-waste introduction variable: world steel production, EU scrap imports, the coking coal price, as well as the month and year dummy variables. These represent scrap steel demand, scrap availability and raw materials/energy inputs. The final model equation is shown in Equation 1.

The other variables such as EU steel production, iron ore prices, sea freight etc. were all rejected from the model as they were either too closely correlated to other explanatory variables or they were statistically significant or they did not improve the fit of the model. The adjusted R-squared statistic comes out at 0.855 (Table 19) i.e. only 14.5 % of the data variation is not explained by the model, which indicates a reassuringly relatively good fit of the model to the data. The Durbin-Watson statistic is on the low side, indicating that autocorrelation may be present in the model, although the value here is not significant.

The main results are shown in Table 20. A clear listing is provided for all of the factors identified, together with their statistical importance (as measured by standard errors, t-statistics and t-tests) and their relative magnitude. The three main explanatory variables are all highly statistically significant, with a positive sign, meaning that these variables are all key drivers of the EU scrap steel price (also shown by the magnitude of the standardise coefficients).

After this it was possible to analyse to what extent the introduction of the Regulation affected the market, after controlling for all other relevant factors. The end-of-waste introduction variable, shown in bold, has a positive sign, indicating that end-of-waste may have increased EU scrap steel prices. However, this key coefficient has a large standard error, and so is not statistically significant.

The very high VIF statistic highlights that multicollinearity is a particular problem here. Nonetheless, with a coefficient magnitude of nearly 11 (Table 21, col.B), this suggests that the introduction of end-of-waste may have caused a 4 % increase in EU scrap steel prices; although this result is not statistically significant.

Equation 1: Scrap steel model – model equation

$$EU\text{ScrapPrice}_t = \beta_0 + \beta_1 EOW\text{Introduction}_t + \beta_2 \text{WorldSteelProduction}_t + \beta_3 \text{ScrapImports}_t + \beta_4 \text{CokingCoalPrice}_t + \sum_{i=5}^{15} \beta_i \text{Month}_{it} + \sum_{j=16}^{22} \beta_j \text{Year}_{jt} + \varepsilon_t$$

Table 19: Scrap steel model – results summary

Dependent Variable	Number of Observations	R	R-square	Adjusted R-square	Std. Error of the Estimate	Durbin-Watson Statistic
Eurofer Scrap Price Index	92	0.944	0.890	0.855	23.23529	1.478

Table 20: Scrap steel model – analysis of variance – ANOVA

Steel Model	Sum of Squares	Degrees of Freedom	Mean Square	F-Statistic	Significance
Regression	302,715.383	22	13,759.790	25.487	0.000
Residual	37,251.630	69	539.879		
Total	339,967.013	91			

Table 21: Scrap steel model – coefficients

Steel Model	Unstandardised Coefficients		Standardised Coefficients	T-statistic	Significance	Collinearity
	B	Std. Error	Beta			VIF Statistic
(Constant)	-90.257	64.795	-	-1.393	0.168	-
EOW Introduction	10.929	17.431	0.078	0.627	0.533	9.708
World Steel Prod.	0.002	0.000	0.386	4.006	0.000	5.834
EU Scrap Imports	0.315	0.048	0.662	6.507	0.000	6.510
Coking Coal Price	0.234	0.075	0.358	3.136	0.003	8.211
Jan	-8.860	12.544	-0.041	-0.706	0.482	2.129
Feb	1.888	12.624	0.009	0.150	0.882	2.156
Mar	-14.465	12.602	-0.067	-1.148	0.255	2.149
Apr	2.890	12.482	0.013	0.232	0.818	2.108
May	-16.574	13.060	-0.077	-1.269	0.209	2.308
Jun	-36.510	13.662	-0.169	-2.672	0.009	2.525
Jul	-26.016	13.109	-0.121	-1.985	0.051	2.325
Aug	-6.848	12.580	-0.032	-0.544	0.588	2.141
Sep	-13.300	12.800	-0.058	-1.039	0.302	1.963
Oct	-34.452	12.655	-0.150	-2.722	0.008	1.919
Nov	-14.111	12.546	-0.062	-1.125	0.265	1.886
Y2006	-83.283	34.924	-0.461	-2.385	0.020	23.574
Y2007	-61.845	28.784	-0.343	-2.149	0.035	16.014
Y2008	-16.095	30.632	-0.089	-0.525	0.601	18.136
Y2009	-55.728	28.194	-0.309	-1.977	0.052	15.364
Y2010	-10.681	25.427	-0.059	-0.420	0.676	12.496
Y2011	13.451	21.656	0.075	0.621	0.537	9.065
Y2012	11.445	13.644	0.063	0.839	0.404	3.598

Table 22: Scrap steel model – residuals statistics

Steel Model	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	148.6479	433.0272	263.4642	57.67619	92
Residual	-46.08176	82.75178	0.00000	20.23261	92
Std. Predicted Value	-1.991	2.940	0.000	1.000	92
Std. Residual	-1.983	3.561	0.000	0.871	92

Equation 2: Scrap aluminium model – model equation

$$EU\text{ScrapPrice}_t = \beta_0 + \beta_1 EOW\text{Introduction}_t + \beta_2 \text{ScrapImports}_t + \beta_3 \text{ScrapExports}_t + \beta_4 \text{AluminaPrice}_t + \beta_5 \text{NaturalGasPrice}_t + \sum_{i=6}^{16} \beta_i \text{Month}_{it} + \sum_{j=17}^{23} \beta_j \text{Year}_{jt} + \varepsilon_t$$

Table 23: Scrap aluminium model – summary

Dependent Variable	Number of Observations	R	R-square	Adjusted R-square	Std. Error of the Estimate	Durbin-Watson Statistic
EU Scrap Aluminium Price	92	0.965	0.932	0.909	74.20790	1.294

Table 24: Scrap aluminium model – analysis of variance – ANOVA

Aluminium Model	Sum of Squares	Degrees of Freedom	Mean Square	F-Statistic	Significance
Regression	5,105,842.176	23	221,993.138	40.312	0.000
Residual	374,463.269	68	5,506.813		
Total	5,480,305.445	91			

Table 25: Scrap aluminium model – results coefficients

Aluminium Model	Unstandardised Coefficients		Standardised Coefficients	T-statistic	Significance	Collinearity
	B	Std. Error	Beta			VIF Statistic
(Constant)	1325.987	188.028	-	7.052	0.000	-
EOW Introduction	80.450	56.140	0.143	1.433	0.156	9.873
EU Scrap Imports	15.390	3.178	0.362	4.842	0.000	5.571
EU Scrap Exports	-1.454	0.657	-0.146	-2.211	0.030	4.329
Alumina Price	0.317	0.160	0.093	1.978	0.052	2.188
Natural Gas Price	-54.084	12.677	-0.349	-4.266	0.000	6.667
Jan	-44.296	41.553	-0.051	-1.066	0.290	2.290
Feb	22.837	41.998	0.026	0.544	0.588	2.340
Mar	39.996	44.893	0.046	0.891	0.376	2.673
Apr	51.406	43.579	0.059	1.180	0.242	2.519
May	-18.898	47.522	-0.022	-0.398	0.692	2.995
Jun	-7.182	44.335	-0.008	-0.162	0.872	2.607
Jul	-48.699	45.326	-0.056	-1.074	0.286	2.725
Aug	61.997	39.938	0.072	1.552	0.125	2.116
Sep	-33.511	44.869	-0.036	-0.747	0.458	2.364
Oct	-65.470	44.112	-0.071	-1.484	0.142	2.285
Nov	-62.654	43.069	-0.068	-1.455	0.150	2.178
Y2006	99.708	72.449	0.138	1.376	0.173	9.946
Y2007	-96.414	72.574	-0.133	-1.328	0.188	9.980
Y2008	-60.455	69.698	-0.083	-0.867	0.389	9.205
Y2009	-424.492	81.462	-0.586	-5.211	0.000	12.574
Y2010	-52.920	73.531	-0.073	-0.720	0.474	10.245
Y2011	-39.650	55.635	-0.055	-0.713	0.478	5.865
Y2012	20.552	35.119	0.028	0.585	0.560	2.337

Table 26: Scrap aluminium model – residuals statistics

Aluminium Model	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	506.4384	1,634.9642	1,234.7808	236.87160	92
Residual	-198.45982	191.96660	0.00000	64.14812	92
Std. Predicted Value	-3.075	1.689	.000	1.000	92
Std. Residual	-2.674	2.587	.000	0.864	92

Aluminium scrap model

The model for scrap aluminium prices is quite similar to that of steel. In this case, four main explanatory variables were kept in addition to the end-of-waste introduction variable: EU scrap imports, EU scrap exports, the alumina price and the natural gas price, as well as the month and year dummy variables. These represent scrap aluminium demand, scrap availability and raw materials/energy inputs. The final model equation is shown in Equation 2.

The other variables, such as aluminium production were rejected from the model because it was insufficiently correlated with scrap prices; presumably because the data only includes primary and not secondary production, or because they were too highly inter-correlated with other included explanatory variables. The adjusted R-squared statistic comes out at 0.9090 (Table 23) i.e. only 9.1 % of the data variation is not explained by the model, which indicates a very good fit of the model to the data. The Durbin-Watson statistic is again on the low side, indicating that autocorrelation may be present in the model, although the value here is not quite significant.

The main results are shown in Table 25. The four main explanatory variables are all highly statistically significant, with a positive sign, meaning that these variables are all key drivers of the EU scrap aluminium price (also shown by the magnitude of the standardised coefficients).

As for the effect of the introduction of the End-of-Waste Regulation, this again has a positive sign, indicating that end-of-waste may have increased EU scrap aluminium prices. However, once more this key coefficient has a large standard error, and so is not statistically significant. The very high VIF statistic highlights that multicollinearity is a particular problem here. Nonetheless, with a coefficient magnitude of 80.5 (Table 25, col.B), this suggests that the introduction of end-of-waste may have caused a 6% increase in EU aluminium prices, although this result is not statistically significant.

Robustness checks

Checks were carried out on the robustness of the final model. These involved building alternative models from the list of nine explanatory variables described above. Each of the different models was assessed in terms of ease of interpretability, the extent to which added variables improved the overall explanatory power, and the degree to which variables were inter-correlated.

With a list of nine explanatory variables under review, over 500 model combinations were possible. Automated procedures within SPSS allowed exploration of the impact of variable selection on alternative models: a 'step-wise' entry procedure was adopted in which each variable was entered one at a time. This involves automatic variable selection using set FIN^a criteria by which those selected have the largest positive or negative correlation with the dependent variable. Those variables that were least correlated were entered last or rejected if they did not meet the entry criteria.

The final model contained the selection of independent variables where cross-correlations were low; indicating that the power of each variable to explain variation in Price Index shifts was relatively independent of the influence of the other variables. This helped to mitigate the possibility that the model might be affected by problems relating to multicollinearity and therefore improved its overall statistical validity (and as shown below the overall fit of the model is relatively high).

Further statistical tests were carried out that examined different measures of multicollinearity (tolerance, variance inflation factors, eigenvalues and condition indexes) in order to identify and eliminate sets variables with near-dependencies. For example, the variable 'sea freight rates' was dropped as it was found to be highly dependent on the variable 'imports to the EU'. The large condition index for the former suggested that small changes in sea freight rates may lead to large changes in the model solution resulting in a less stable model. This variable was dropped in favour of 'imports to the EU'.

^a FIN or F-to-enter criteria, were set at a default value of 3.84, a minimum value of the FD static that a variable must achieve in order to enter the model

6 Impact on administration and the environment

This chapter summarises the perceived impact that the Regulation has had on administration and the environment from the perspective of EU Member State Competent Authorities.

The chapter includes information and discussion on the following topics:

- the extent to which Member States have implemented the end-of-waste concept for scrap metal
- whether it has affected administrative efforts and costs related to the management of scrap
- what environmental quality controls are in place for end-of-waste compliant scrap
- whether any incidents related to end-of-waste metal scrap have been reported.

6.1 *Profile of survey participants*

6.1.1 Sampling approach

In order to collect evidence to inform this discussion, a survey was distributed to the EU Member State Competent Authorities dealing with end-of-waste issues across the Member States (see Annexes for a copy of the survey). This included representatives from Federal Ministries, Environment Protection Agencies, Custom Authorities, Regional Authorities and third-party Certification Authorities.

The sampling approach taken to encourage Competent Authority participation in the end-of-waste survey was to engage the national coordinators of the European Union Network for the Implementation and Enforcement of Environmental Law (IMPEL), after permission was obtained from the IMPEL secretariat. IMPEL has 47 members from 33 countries including all EU Member States, the former Yugoslav Republic of Macedonia, Turkey, Iceland, Switzerland and Norway. The Network's objective is to ensure effective application of environmental legislation through: awareness raising, capacity building, peer review, exchange of information and experiences on implementation, international enforcement collaboration and supporting the practicability and enforceability of European environmental legislation.^a

The original survey approach to the Competent Authority survey received 12 responses. In view of this limited survey participation, the Competent Authorities' survey was reopened for responses until the end of April 2014, and sent to additional EU Member State contacts from DG Environment's Technical Advisory Committee on the Waste Framework Directive. It was the aim of this additional action to encourage greater participation in the survey and hence to improve the representativeness of participation in the study.

6.1.2 Representativeness of participation

27 survey responses to the Competent Authority survey were submitted. Most of these were submitted in English, and around half in the Word template rather than the online format. One survey each was received in French, German and Italian; none were completed in Dutch.

A few incomplete submissions were received meaning that the overall sample size was 24. The surveys were received from a range of EU Member States and also from different types of organisation. The role within the end-of-waste framework of these Authorities is shown in Figure 99. The most common responses for organisation type were Federal Ministry and Environmental Protection Agency. Five participants selected the 'Other' classification, although these could be reasonably classified as 'Federal Ministry', 'Environment Protection Agency' or 'Regulatory Authority'.^b

^a IMPEL website: <http://impel.eu/about/> [accessed December 2013]

^b These 'other' answers included: 'Enforcement Authority', 'Inspection Authority', 'Environmental Regional Authority', 'Environmental Ministry' and a joint response between a Federal Ministry, Environmental Protection Agency and another organisation.

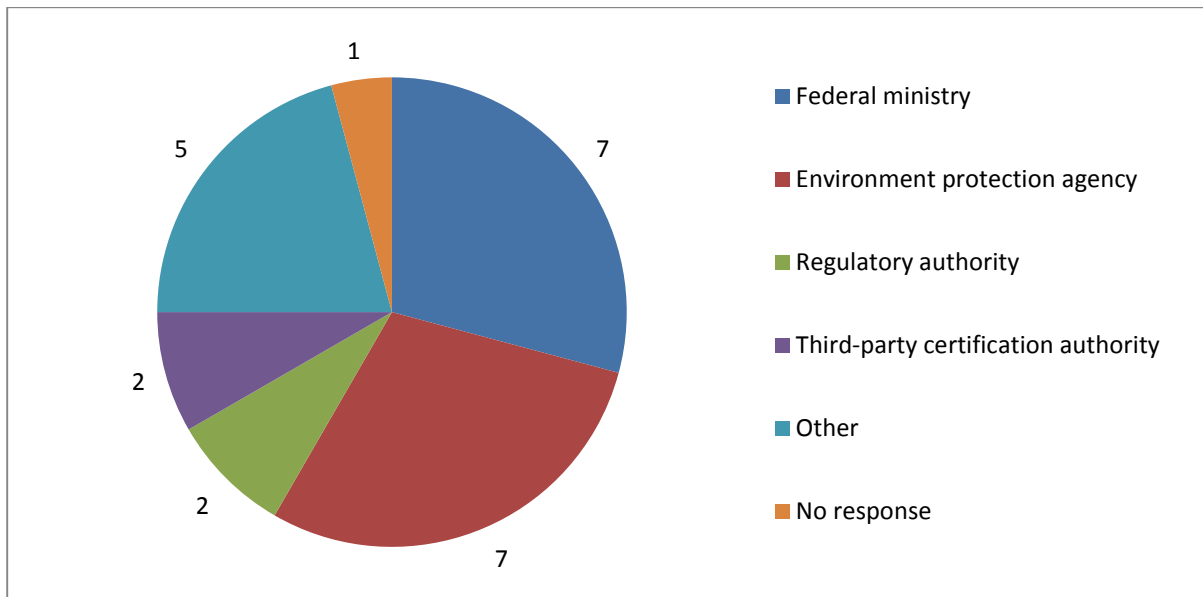


Figure 99: What is your role in the end-of-waste framework (24 responses)



Figure 100: Geographic coverage of Competent Authority survey participants (24 responses)

The geographic coverage of the Competent Authority survey is visualised in Figure 100. Note that two survey responses were received from Belgium, Portugal, Italy and Sweden. Therefore, only 20 countries are shown as responding to the survey (including Norway). These multiple responses include some from third-party certification authorities and also by regional authorities.

Information was received via email from Germany focusing on the situation in Hamburg and the partial response from Ireland came on behalf of NQA, a certification body, rather than the national government. Nonetheless, the overall geographic coverage of the survey is considered to be fairly comprehensive.

6.2 Registration and monitoring

6.2.1 Registration

Survey participants were asked how many end-of-waste producers (as defined in Regulation 333/2011) had been registered in their country. The responses in Figure 101 show the following:

- Twelve countries report that there are no end-of-waste scrap producers registered.^a
- Six countries report that between one and 10 companies are registered.
- In Italy, there are a very large number of end-of-waste authorised producers.

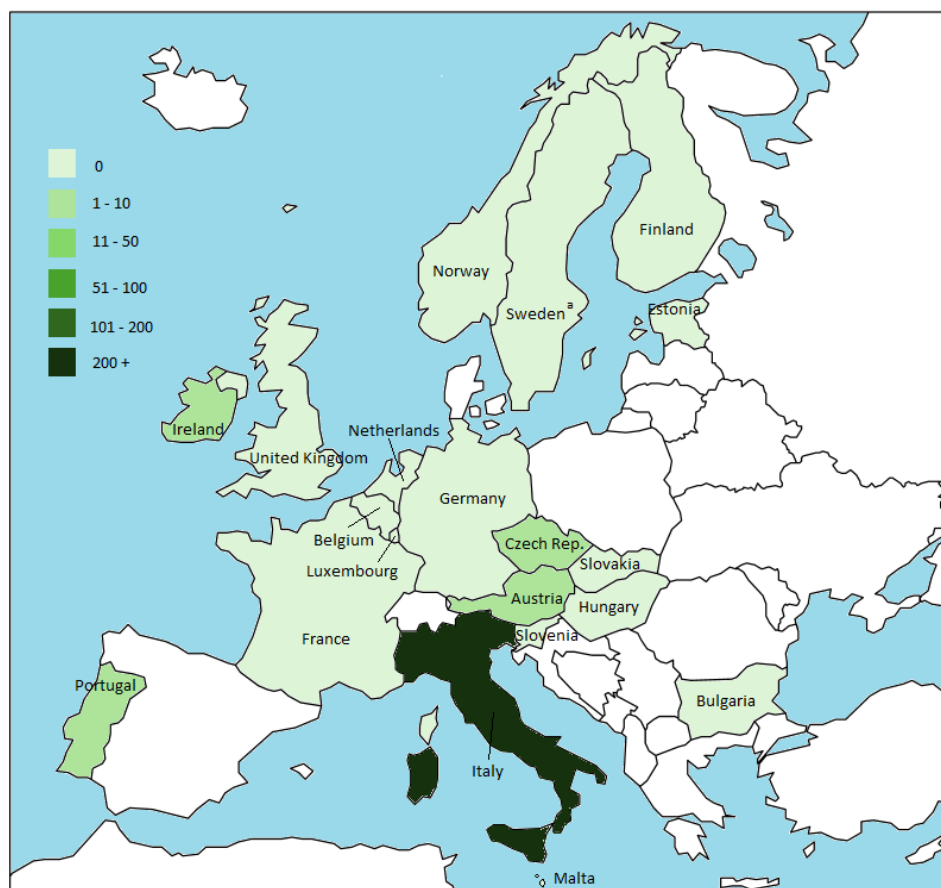


Figure 101: How many end-of-waste producers (as defined in the Regulation 333/2011) do you have registered? (19 responses)

An extended comment was provided by the Italian Environment Ministry to explain the situation there:

"The term registered is not appropriate to describe the Italian situation. In Italy there are more than 1,000 EoW producers that are regularly authorised by the local competent authorities as waste management companies – by provinces for simplified authorisations and by regions for normal authorisations.

However in Italy a specific "register" of EoW producer does not exist. It is therefore not possible at the Ministry level to have the exact knowledge about the number of EoW producers. A number of more than 1,000 is the likely estimate of uptake, provided by the association of metal recyclers and confirmed by the certification bodies."

^a Note: the Swedish County administrative board of Skåne reported that 11-50 end-of-waste producers are registered there, although this contradicts the official view of the Swedish Environmental Protection Agency, who is not aware of any registrations within Sweden.

The further information and comments provided by some survey participants reveal further insights.

In particular, the survey has confirmed that there is no legal requirement to ‘register’ end-of-waste producers – as identified by seven of the responses (Figure 102). In some Member States this appears to mean that Competent Authorities simply did not know how many end-of-waste producers were operating in their Member State. Furthermore, eight survey responses noted that they had not received any applications to register end-of-waste producers.

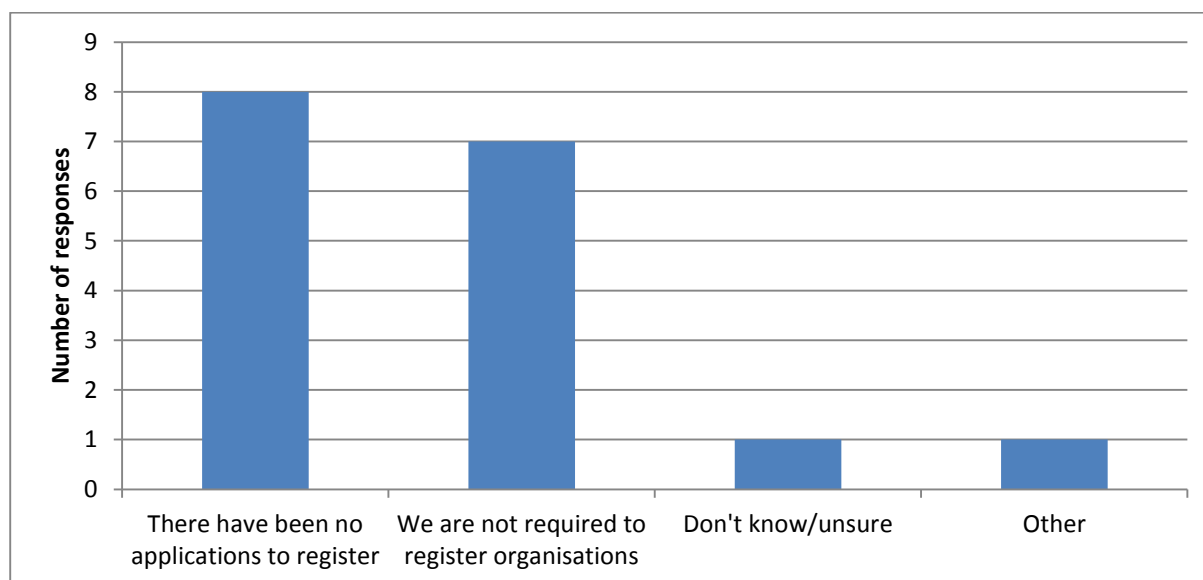


Figure 102: Why do you not have any end-of-waste producers registered? (15 responses)

However, these comments do not necessarily imply that no companies are indeed applying end-of-waste criteria. The seven countries (not including Italy) together reported a total of around 50 producers. Of the remaining countries which report no registrations, in one case, one company had considered achieving end-of-waste status but decided against it. These figures can be aggregated and compared to those found in the industry survey to cross-check the overall uptake of end-of-waste.

In Norway, end-of-waste regulations for aluminium and ferrous scrap came into force in December 2013; therefore no producers could be registered at the time the survey was completed.^a This difference is due to the fact that Norway is not a member of the EU and therefore is not required to introduce such laws into its legislation. In addition, the Norwegian Competent Authorities stated that registration of end-of-waste producers is not a requirement of Regulation 333/2011, but industry has welcomed the regulation.

Other comments received include:

“The Walloon government has yet to adopt the orders of performance for any provision listed in Article 4 of the Decree of 27 June 1996 on waste.”

“The reason that there is no registration is that the required administrative procedures imposed by the respective regulation are judged to be too burdensome and out of proportion compared to the usefulness of the instrument. Therefore, metal scrap in Hamburg remains in the waste law regime.”

^a Forskrift om endring i avfallsforskriften (kriterier for avfallsfasens opphør for visse typer metallskrap og glass), 2013. <http://emeritus.lovdata.no/ltavd1/filer/sf-20131209-1418.html> [Accessed February 2014]

Figure 103 shows the geographic coverage for the companies generating end-of-waste scrap.

It should be noted that 27 out of 153 companies operate in more than one European Member State; therefore, end-of-waste criteria may be achieved in one country but not necessarily in all countries where such companies operate. In addition, 137 of responding companies were located in Italy; 24 of these also operate in other countries.

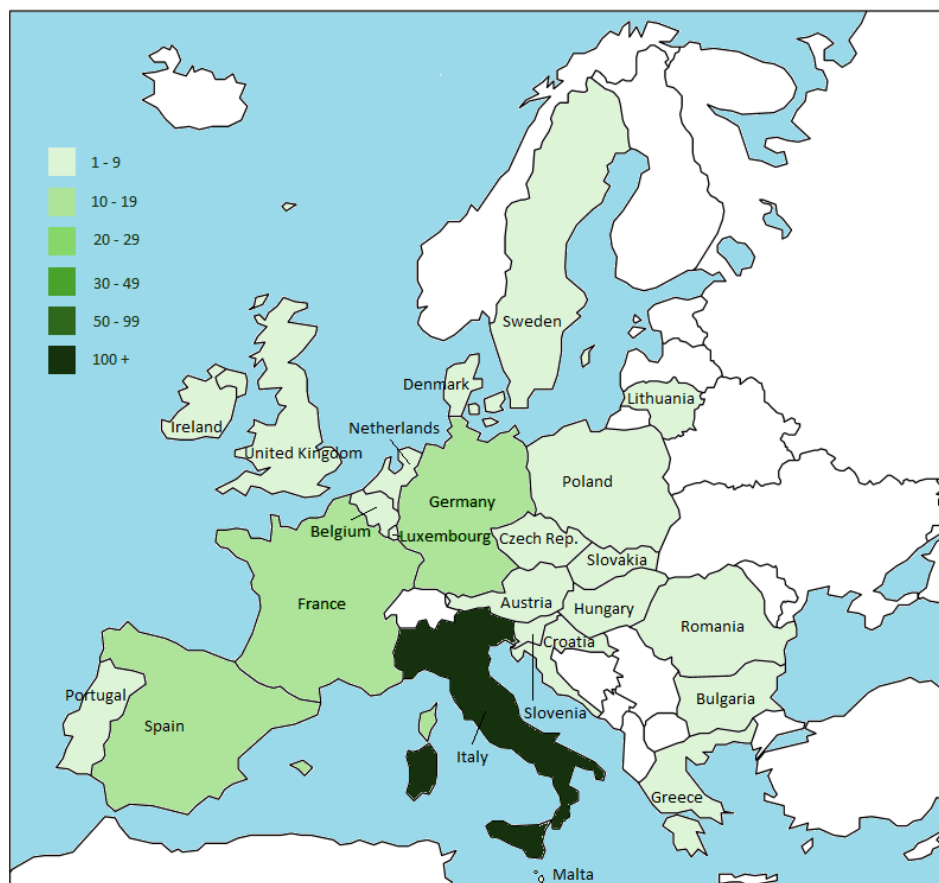


Figure 103: Geographical coverage of companies generating end-of-waste scrap (153 respondents)

Source: Scrap industry survey

This map can be compared to Figure 101, which shows the number of registered producers according to organisations that responded to the Competent Authority survey. The number of producers reported in most countries, including Austria, Belgium, the Czech Republic, Estonia, Finland, Ireland, the Netherlands and Portugal, are consistent in the two Figures.

However, closer analysis of Figure 103 does also show some inconsistencies in the data. This is possible if the other end-of-waste generators did not respond to the survey. In addition, the industry survey revealed end-of-waste producers operating in France, Luxembourg, Hungary, Malta, Slovakia, Slovenia and the UK. However, survey results indicate that most of these producers operate in more than one country; therefore the end-of-waste may have been achieved at other locations. Furthermore EU Member States have no obligation to register end-of-waste companies.

6.2.2 Industry reactions

Finally, the survey respondents were asked to provide any comments outlining industry reactions to the Regulation. With the notable exception of Italy, all the comments were provided by the Authorities located in countries where no end-of-waste scrap metal is currently being produced.

Some comments show a generally supportive reaction to end-of-waste. However, other comments reveal a difficulty in achieving end-of-waste status or the cost of quality criteria for metal scrap or show that these countries have reacted in different ways to the introduction of this Regulation.

“The industry seems to welcome the regulation.”

“Complicated system. Proceed as waste not products because it is easy and cheap. Who (authority) can give the conformity in accordance?”

“The industry has put forward that they don’t use the end-of-waste criteria since the quality criteria in the ordinance are not strict enough. Also they already had a system established for recycling of these waste metal flows before the introduction of end-of-waste criteria.”

“Our industry seems to continue to operate with waste status. They might not see any added value with end-of-waste procedure. One company considered starting end-of-waste procedure, but they gave up.”

“Industry has informed us that they prefer to buy the steel scrap as waste rather than as end-of-waste, because they can buy it cheaper as waste.”

“In general operators are in favour of the 333/2011 regulation even though they now have to apply a certification system/QMS which was not compulsory in Italy before. Because a national EoW regulation already existed in Italy before the entry into force of the 33/2011 regulation, the recognition at the EU level of the status of EoW for certain secondary raw material is important and gives certainty and recognition to the operators at EU level.”

“Consultations with external stakeholders and the public with regards to end-of-waste criteria for certain types of scrap metal were carried out in Malta.

Although no objections were raised during the consultation process on Council Regulation (EU) No 333/2011 establishing criteria determining when certain types of scrap metal cease to be waste under Directive 2008/98/EC of the European Parliament and the Council as circulated, some stakeholders have highlighted that abiding with the provisions laid down in Regulation 333/2011, would result in an additional financial burden thus making their operations less profitable than to export the scrap as waste under the waste regime.”

“There is no legal request to have any reactions or information from industry to the end-of-waste Regulation. We have only unofficial information based on informal discussions with any WEEE Recyclers in Slovak Republic and accreditation body for end-of-waste management.”

6.2.3 Monitoring

Competent Authorities were then asked about how they monitor the implementation of the End-of-Waste Regulation in their Member State, and any scrap producers that might be active in end-of-waste there. Some authorities also provided some comments relating to the European situation.

Firstly, Competent Authorities were asked whether they collect information on end-of-waste producers. Seven of the sixteen survey respondents reported that they collect data relating to end-of-waste compliant companies; nine reported that they do not collect any data (Figure 104).

Of those authorities that declared they collect information, the majority collect company information including: company name, address and information on the company's quality management system (QMS). Two authorities also request written confirmation of compliance, although none collects copies of each statement of conformity. Three authorities collect information on the quantity of end-of-waste produced, with one collecting information on the grades of compliant scrap. Two authorities commented that the information collected varies by regional authority (Figure 104).

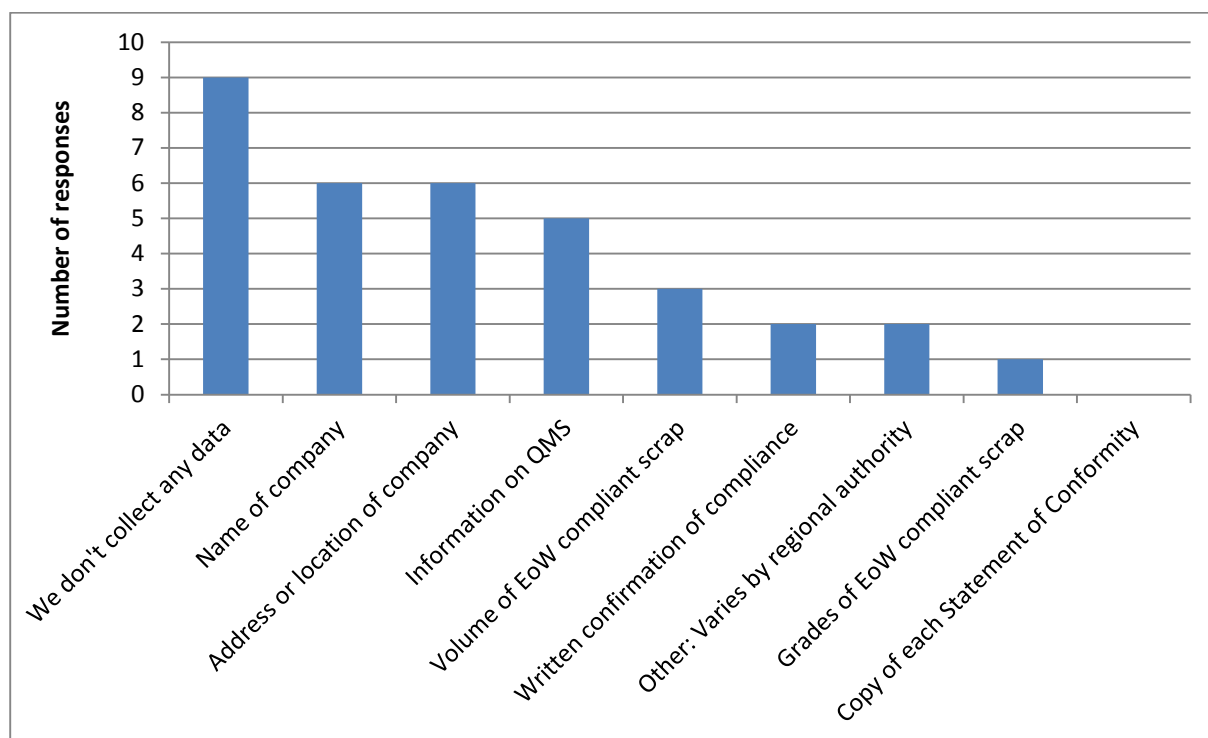


Figure 104: What data do you collect from these end-of-waste producers? (16 respondents)

Six Competent Authorities provided further information on their data collection methods and frequencies, revealing slightly varying approaches – some authorities collect the data when the organisation first applies, whereas others collect data as part of a review process. Annual data collection was identified as being relatively common.

Table 27 summarises the methods used to collect the data, which include audits, electronic submissions/register, and site visits. In one case, waste data is collected for end-of-waste scrap regardless of the fact it has achieved end-of-waste status.

Table 27: Data collection methods and frequency (6 responses)

How is this data collected?
We carry out audits.
The organisation submits this information electronically at the annual waste report, which of all waste collectors and managers, regardless of the types of waste, must report.
We conduct site visits, we carry out audits.
Flanders keeps a digital register.
The organisation provides the information when asked for a waste operation permit, and when the permit is reviewed. The organisation provides information on waste managed once a year to ISPRA, but until 2015 it is not possible to distinguish between EoW production and other waste recovery operations.
Regular annual reporting of waste treatment operators.

For the nine Competent Authorities which reported that they do not collect monitoring data: the reasons why are shown in Figure 105. The main reason is because Regulation 333/2011 does not require such

information to be collected. Another common reason was the lack of compliant or even interested companies. In two cases it was also stated that the appropriate human resources were not available and in one case that data was not collected to reduce the producers' administrative burden.

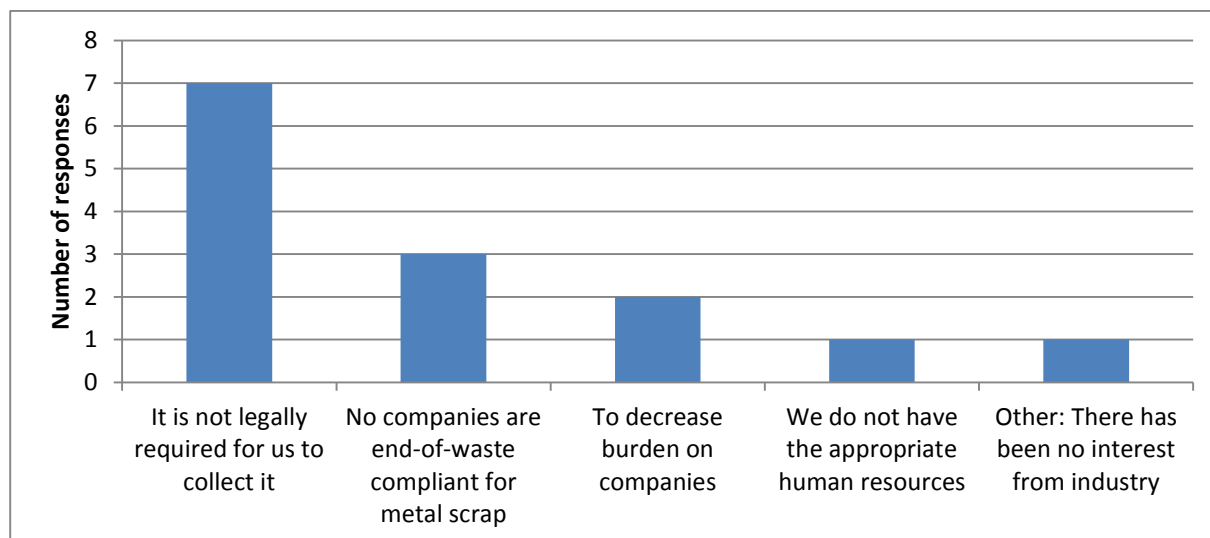


Figure 105: If you do not collect this data, please specify why. (9 respondents)

Competent Authorities were next asked whether they monitor end-of-waste compliance once producers have been registered, to which 14 responded.

Seven (50 %) of the respondents monitor the compliance of end-of-waste scrap producing organisations (Figure 106). These were mostly in countries in which end-of-waste scrap is currently generated. One organisation stated that it does not monitor compliance due to the lack of available resources even though there are end-of-waste producers registered in this country.

The other half of the respondents reported that they do not currently monitor end-of-waste compliance. Low monitoring activities can be expected, given that end-of-waste scrap metal is only generated in eight of the responding countries. Little monitoring of producers is therefore required in these countries.

Two authorities identified that other organisations are responsible for monitoring, notably in relation to extended producer responsibility schemes (EPR) for WEEE and ELV or an accredited certification body. Slovenia commented that the application process to accredit the certification body for quality systems of the manufacturer's scrap metal is not yet complete.

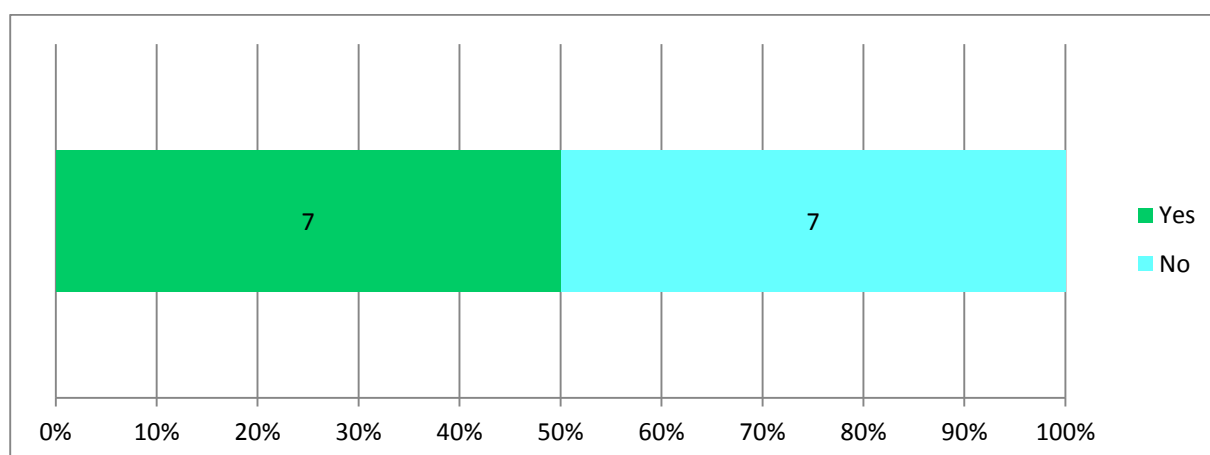


Figure 106: Do you monitor compliance of end-of-waste metal scrap producing organisations? (14 respondents)

Quite a few comments and observations on monitoring were made by the survey participants. The comments below were provided with regard to the monitoring method or organisation. In the first case, a risk-based approach is taken; in the others, regular monitoring is carried out. Other comments identified a slow process in organising the verifications and accreditation.

"If we suspect that something is wrong (breach of the rules), we request to see copies of the statement of conformities issued by producers or importers. Only in case of suspicion. In last three years we have investigated only one breach of 333/2011 (with negative result)."

"First of all the competent authorities monitor compliance before giving the permit and after the permit has been issued. Competent authorities can perform all the monitoring which believe necessary. Other institutions which can perform monitoring and inspections are: Carabinieri, Guardia di Finanza, Provinces, Guardia Forestale, and environmental protection agencies."

*"We verify (at least every three years) that the producer or exporter of end-of-waste compliant scrap has the correct quality management system in place, as outlined in Regulation 333/2011 Article 6.5" – **Four participants selected this option** (or similar).*

"[We conduct] regular checks on the general inspection obligations of waste producers, waste collectors and waste handlers."

"We periodically conduct a site visit/on site audit of all compliant organisations."

"We periodically request to see copies of the statement of conformities issued by producers or importers."

"We periodically undertake a written or online survey of all compliant organisations."

"In Flanders and Brussels Capital Region we still experience difficulties (together with the accreditation body to organise the verification process. Negotiations are still running between competent authorities and the national accreditation body."

"One application was put in for the accreditation of a certification body for quality system of the manufacturer's scrap metal. The process is not yet complete. Once a certification body accredited, this body should carry out annual inspections at the manufacturer of scrap metal. Certification body will be accredited according to SIST EN ISO/IEC 17021, subject to Regulation (EU) 333/2011."

"In Hungary the local Inspectorates manage the licensing of end-of-waste for scrap metals."

"Producers of any waste commodities with obligated EPR (WEEE, ELV) monitor compliance and other data with data charging."

"No / little experience. We don't have any cases. Don't have experience of this."

Finally, Competent Authorities were asked whether there was a requirement for additional monitoring of end-of-waste scrap metal compliance (Figure 107). Opinion for this question did not reach any clear consensus. 11 participants (50 %) did not know whether any additional monitoring was necessary. This could be expected, as end-of-waste criteria have been introduced recently and have not had much, if any, uptake in some of the responding countries.

Of the remaining responses, slightly more than a quarter (6 out of 22) indicated that they did believe that there was a need for more monitoring of end-of-waste, with slightly less than a quarter disagreeing that more monitoring was necessary. The Authorities which believed that more monitoring is required are generally located in countries where end-of-waste scrap is produced, whereas those organisations who did not think more monitoring was necessary were more likely to be from a country where there has been little uptake of end-of-waste so far.

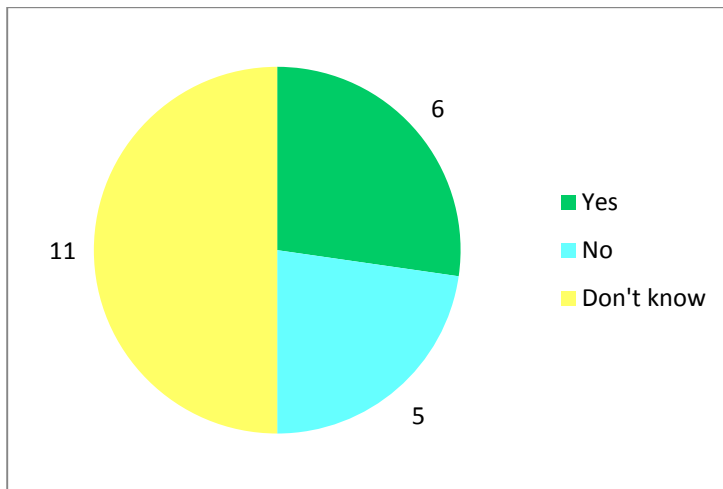


Figure 107: Do you think there is need for more monitoring of end-of-waste scrap metal compliance? (22 respondents)

The following comments were made with regard to how and whether future monitoring should take place. In one case, it appeared that some Competent Authorities do not have sufficient experience with end-of-waste to provide further information on monitoring requirements. In another case, an organisation with registered producers believes that end-of-waste generators should be certified, registered and should report annual production data. National/EU registers or studies are encouraged.

"We have no idea. We are not sure that additional monitoring is needful. We have almost no experience with checking the Regulation 333/2011."

"[There should be a] general obligation to hold a certificate of conformity analogous to product regulations, such as Article 32 of the REACH; Registration and reporting obligations, specifying the planned quantities of the producers of end-of-waste scrap and an annual obligation to disclose the quantities produced in Regulation (EU) No 333/2011."

"An EU register of companies who apply EoW regulations is the first step. The results of their audits should be added to this register."

"The Italian Environmental Protection Agency (ISPRA), thanks to a recent modification of the legislation on waste data collection, will start to collect the information on EoW producers. Therefore such data will be available from 2015 at a central level".

"Quality Management System's verification should be carried out every 1 year (not every 3 years)."

"It might be worth studying whether EoW really gives any advantage to the companies."

"Before the adoption of EU Regulation 333/2011, the market for recycled ferrous metal scrap was already working at the global scale/global level. In the best of cases, the market was already using/was compliant with Annex VII of the Transfer of Waste Regulation. The norms and other standards outlined in Regulation 333/2011 were already in force. The desire to increase controls/checks would create an additional administrative burden/constraint for waste operators. This analysis is primarily applicable to material streams that are recycled via an industrial process."

Material streams that are directly recycled [reuse] in to the environment/in to nature should require more stringent controls – certainly more stringent controls than a 'simple visual examination'."

"With a specific survey and mapping to harmonise the data collection throughout Europe."

6.3 Administration and environment

6.3.1 Administration

The next sections of the Competent Authorities survey concerned the administrative costs for end-of-waste and any identified impact upon the environment.

Firstly, Competent Authorities were asked whether End-of-Waste Regulation 333/2011 has led to any increase in administrative costs for Competent Authorities (Figure 108). Most survey participants, at around two thirds of responses, answered either 'no change' or 'don't know'. One third of the responses indicated that there had been an increase in costs, although all of the participants felt that this increase was slight rather than significant. None of the survey participants reported any decreases in costs for authorities. No discernible difference in the pattern of responses can be identified between countries with or without any compliant producers.

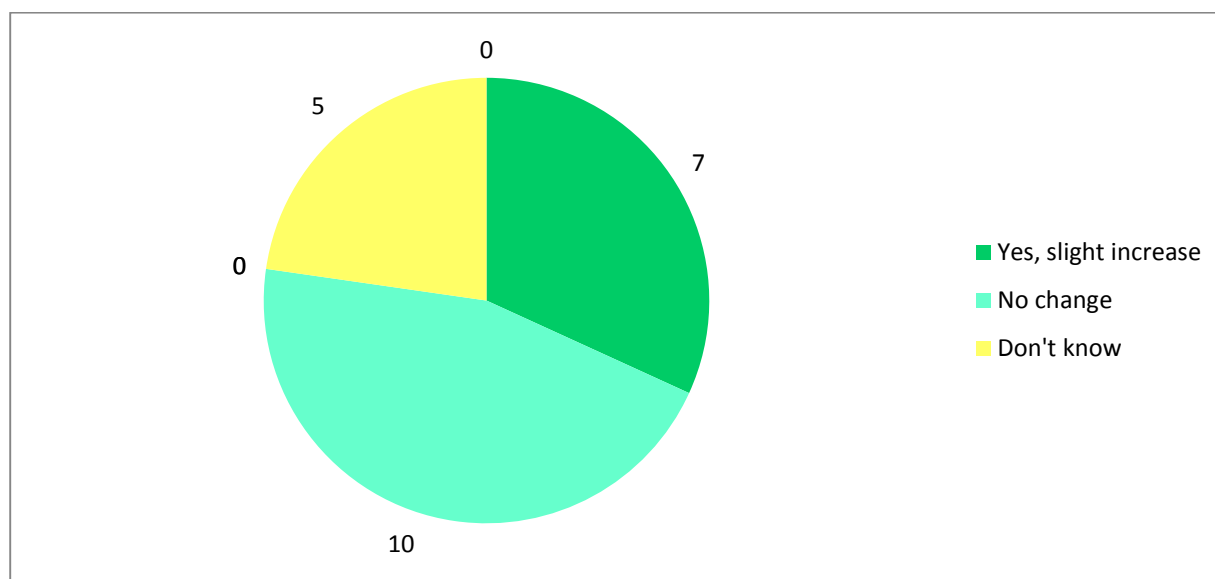


Figure 108: Has end-of-waste compliance for scrap metal resulted in an increase in costs for authorities? (22 responses)

The reported reasons for the perceived increase are varied (Table 28). According to the three organisations located in countries where end-of-waste compliant companies are registered, the increase is due to monitoring requirements, accreditation costs, the development of guidance explaining the relation between recycling and end-of-waste criteria, and to the costs incurred in training staff within the Competent Authorities.

The reasons provided by the other organisations are: registration process, material testing, enforcement, provision of guidance on the Competent Authority's regulatory role in relation to the new regulations, training and informing staff and industry stakeholders, and costs related to the supervision of customs.

In general, some of these cost increases could be identified as transition costs. In particular, the preparation of guidance, internal training of staff, registration of companies and the development of additional procedures should all be seen more as 'one-off' costs, rather than on-going needs. Some of the other identified cost increases relate to on-going monitoring, including site visits, materials testing and enforcement. However, it may be that some synergies are possible with other current activities conducted by Competent Authorities once the transition period has occurred.

Table 28: What are the increases in costs or administrative requirements due to? (10 responses)

Reasons given for increases in costs or administrative requirements
Registration process , site visits, material testing and enforcement
Guidance concerning the relation between recycling and the end-of-waste-criteria. Education within the authority regarding end-of-waste.
Accreditation costs. Additional procedures required development in the initial stages.
So far mainly the supervision of customs and enforcement.
Registration process and material testing.
Monitoring – [there is] no obligation to carry a Declaration of Conformity.
Provision of guidance on our regulatory role in relation to the new regulations and to answer queries from our staff and industry.
Preparation of various actors to implement the regulation.
Data collection and the registration process/system for companies.
Enforcement and monitoring.

The responding Competent Authorities were also asked whether there had been an increase in administrative requirements since Regulation 333/2011 came into force (Figure 109). As with the previous question, most participants answered either 'no change' or 'don't know'.

Eight of the responding organisations (just over one third) thought that there had been a significant or slight increase in these requirements. The reported reasons for the perceived increase in administrative burden are similar to those leading to additional costs (Table 28). These are: site visits, material testing, enforcement, the production of guidance on end-of-waste and training requirements for members of staff. None of the organisations reported a decrease in the administrative requirements.

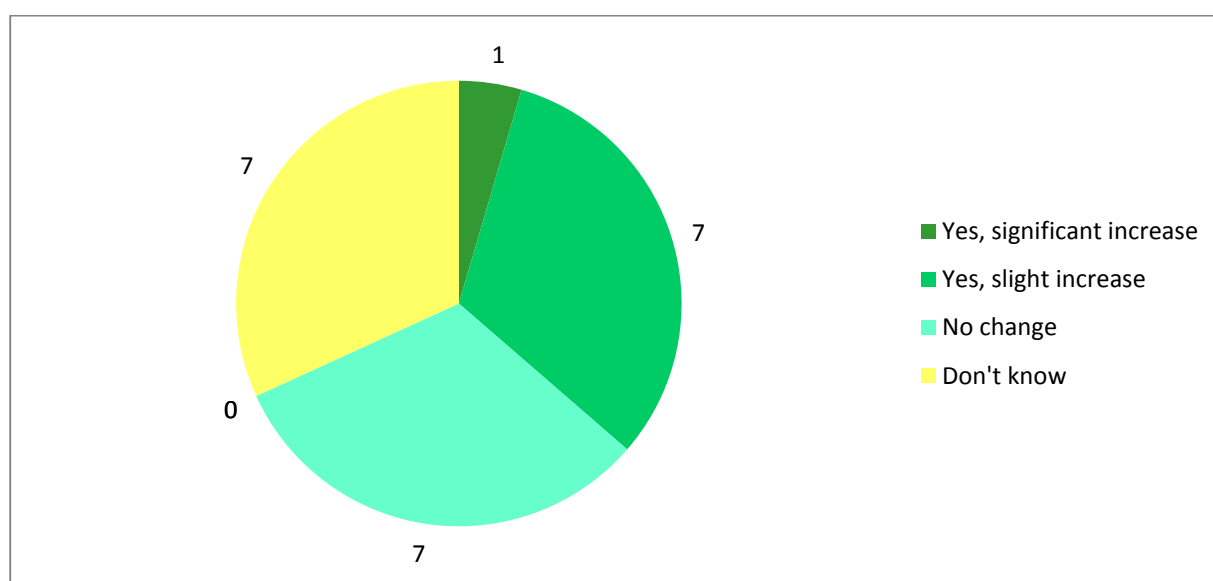


Figure 109: Has the introduction of end-of-waste compliance for scrap metal increased the administrative requirements for authorities? (22 responses)

An interesting point to note is that some Authorities which have not registered end-of-waste producers have experienced additional administrative costs requirements. As mentioned above, this is due to the preparation required for these Authorities to be able to meet their duties with regards to end-of-waste products, such as training staff and providing guidance for the waste industry. Enforcement and custom duties have also been highlighted as additional requirements. Although end-of-waste is not produced in these countries, scrap is likely to be imported.

6.3.2 Environment

Finally, survey respondents were asked to provide information regarding any reported environmental and human health incidents related to non-compliant and compliant metal scrap (Figure 110/Figure 111).

In both cases, the majority of authorities, around 60 %, answered that no environmental or human health incidents had been reported for either end-of-waste or non-compliant scrap. More than a quarter of authorities answered 'don't know' to this question. According to these figures, the management of waste metal scrap and end-of-waste compliant metal scrap has, in general, not posed any danger to human health and the environment in the majority of the countries in the EU.

Notably, two countries responding to the survey did report that environmental and human health incidents relating to scrap metal had occurred:

- Hungary identified five reported incidents relating to end-of-waste compliant scrap not meeting the required standard, and identified that these incidents would not have occurred with waste scrap (it might be presumed that the quality of the supposed end-of-waste scrap did not meet the end-of-waste criteria, and so was designated as waste rather than end-of-waste after its inspection).
- In the Netherlands, ca. 500 shipments of metal containing waste were checked by Dutch Customs in 2012. In seven cases the shipment did not comply with the Waste Shipment Regulations and was returned to country of origin. As for end-of-waste, so far the Dutch Inspection has checked three shipments originating from a different EU country, and all complied with Regulation 333/2011.

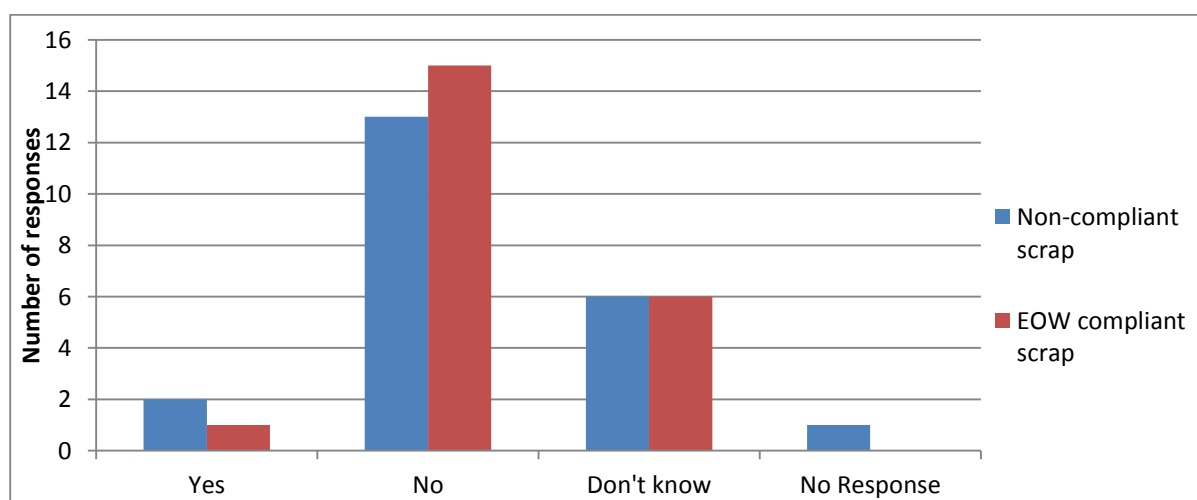


Figure 110: Have there been any reported environment and human health incidents? (22 respondents)

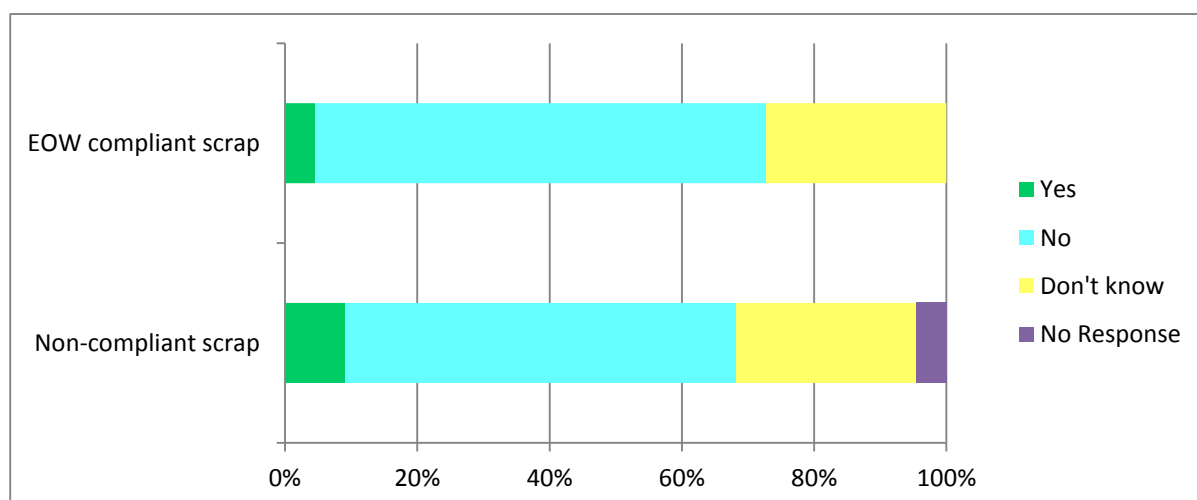


Figure 111: Have there been any reported environment and human health incidents? (22 respondents)

6.4 Additional comments

6.4.1 Comments on criteria

The following comments were received relating to the specific criteria for end-of-waste compliant scrap:

“Evaluation of limit values should be carried out in order to really produce only high quality end-of-waste scrap”

“The Point 1.1.3 of Annex 2 of the EU Regulation No. 333/2011 states that the end-of-waste aluminium should not contain PVC coating. We think that “plastic coating including chlorine” would be better.”

“Differently from the later regulations on copper and glass, the lack of identification in the 333 regulation of the characteristics of the conformity assessment body or environmental verifiers, has determined the fact that certifications have been emitted from subjects who are not expert in the waste sector and without the necessary skills:

- It is not clear if the specification EN 13920 shall be used for establishing the impurities matter content.*
- It is not clear in the regulation that the statement of conformity shall follow the EoW metal scrap until the final destination in the foundries. The regulation only requires that the statement of conformity shall be transferred from producer to next holder (first holder after the metal scrap has ceased to be waste).”*

“In Italy, before the approval of the 333 regulation, there was a kind of “national End of Waste” regulation in force which was stricter than the 333, the quality of EoW metal scrap has worsened since 333/2011 regulation has entered into force. In particular, Italian previous regulation requested limit values for PCB/PCT, oil, organic solvents, and fine dust. Limit values for foreign material was fixed at 1 % instead of 2 %. Also no limit value for oxides is required.”

“The lack of specific treatment requirements for certain type of scrap metals (coming from WEEE or ELV) can be dangerous and requires strong monitoring of the EoW resulting from the process. It would have been preferable to establish compulsory minimum waste treatment operations to be carried on metal scraps coming from RAEE and WEEE.”

6.4.2 Comments on complexity

The following comments were received on the complexity of Regulation 333/2011 and its applicability:

“The introduction of the concept of end-of-waste has in general led to a lot of confusion regarding the possibility to recycle waste that also can go through end-of-waste procedure. According to our opinion the end-of-waste criteria do not fulfil their purposes. In many ways they complicate a sector that is already complex (waste recycling sector).”

“We are persuaded that the practical implementation of Regulation 333/2011 is still difficult, because a number of key questions remain unanswered.”

“Due to the unclear article 6 (Quality Management) of the 333/2011 Regulation, long debates between the regional authorities, waste management organisations, companies and the national accreditation body have been taken place regarding how and which verification procedures have to be followed.”

“To reach end-of-waste status according to Regulation of 333/2011, we do have not a unique suggestion for what R code should be used. One opinion is to use R12, but afterwards this cannot be applied again recovering or recycling with code R4; another opinion is to use code R4. We also asked EK, but the answer was not explicit. Regional administrative environmental departments, who are responsible for permissions for subjects who treat waste, incl. definitions of recovering codes R1 – R11.”

6.4.3 Further comments on specific national situations

The following comments were received relating to the Authorities responsible for monitoring end-of-waste compliance and the accreditation process in the UK Italy, the Netherlands and Malta:

United Kingdom

"Uptake in the UK has been slow due to accreditation processes. UKAS only communicated their plans to provide accreditation in mid-2012, and accreditation in general is a slow process. It is my understanding that uptake has been slow due to organisations not being aware of the Regulations, or them waiting for the Copper Regulations coming into force to gain both approvals. I anticipate interest / uptake to increase significantly in 2014.

There is no relationship to hazardous waste control. This questionnaire is targeted at waste regulatory authorities. This is the wrong focus and nor are waste regulatory authorities in Member States the only body involved in end-of-waste decisions. The key element of end-of-waste regulations rests with the implementation of a QMS. Any QMS must be certified by an accredited certification body (CB). A CB must be certified for end-of-waste every 3 years. National accreditation bodies in each Member State (UKAS within the UK) there have a key (if not the key) role in implementing the EC End-of-waste Regulations. It is these bodies which hold much of the information this questionnaire seeks."

"Within the UK, UKAS has accredited only 1 (one) CB for scrap metal. The inference therefore is that the scrap metal industry within the UK are making little use of these regulations. In discussions with the UK scrap metal industry in 2011 they indicated that they would not make much use of the Regulation, which seems to be borne out by the experience of UKAS."

Italy (see also other comments above)

"Due to a number of issues there are cases in Italy of commercial enterprises which have been certified as EoW producers from foreign certification bodies, although they only buy and sell EoW. Such enterprises sell EoW metal scrap to the foundries by emitting new statement of conformity because they do not want to reveal the name of the original EoW producers."

Netherlands

"As far as we know EoW based on the regulation 333/2011 is not applied yet by industry in the Netherlands. One of the reasons seems to be the lack of clarity on the issue of accreditation. The Dutch Metal recycling Federation is working on guidance for its members to support and facilitate the application of regulation 333/2011."

Malta

"Malta believes that the provisions laid down in Council Regulation (EU) No 333/2011 are too onerous, increasing amongst other financial and administrative burdens for local scrap merchants when compared to current practices of exporting scrap metal as waste.

Malta believes that unless the price for end-of-waste scrap metal significantly exceeds the costs to comply with the Regulation making it more profitable to ship the material as a product than as a waste, then there will be no incentive for local scrap merchants to invest in achieving an EoW status. Having said so, Malta further believes that this is highly dependent on the market price of scrap metal determined by international metal trading organisations and metal exchange markets."

7 System for future monitoring

7.1 Rationale for monitoring

As part of the study, a concrete long-term system for monitoring the on-going impacts of Regulation 333/2011 has been developed. This task is necessary because the introduction of the Regulation is at a relatively early stage, which means that its impact may not yet be known or fixed, and may therefore be subject to review and revisiting at a later date.

This chapter summarises and identifies a timeline for future analysis, review and monitoring activity. The activities conducted within this study show and exemplify a method for collecting data on the uptake and impacts of end-of-waste, including an indication of which organisations are able to provide statistics on selected topics. It also identifies the gaps that are apparent in the available data and makes suggestions about how to fill these. However, it is recognised that it may not be possible to repeat the data collection exercise in full.

It is therefore important to identify which bodies will or may be able to collect data based on objective criteria or commitments. Recommendations are provided on which indicators should be monitored, and the level of detail for which data is essential, desirable or useful. This includes suggestions on prioritising the data collected and the results obtained, and the overall the cost-effectiveness of collecting this data.

7.1.1 Stakeholder feedback

On 31 March 2014 an Expert Workshop was held on *Monitoring impacts from Council Regulation (EU) No 333/2011 (End-of-waste criteria for Aluminium and Ferrous scrap)*, at DG Environment, Brussels. This Workshop was attended by experts from various areas of the aluminium and ferrous scrap recycling chain, including representatives from industry and Competent Authorities, and the Commission. The experts shared their experiences of end-of-waste, its implementation, benefits and impacts.

As part of the workshop, project partners Oakdene Hollins and Quality Consultants presented the preliminary results of the monitoring study, and invited feedback for filling existing data gaps and establishing future end-of-waste monitoring. Part of the purpose of the expert workshop was to secure some possible commitments with regard to the future monitoring framework.

The workshop participants were generally positive about the work conducted in the study, and several ideas on the system for future monitoring were proposed, presented and debated:

- on-going monitoring activities of market data on scrap metals
- specific monitoring by EU Member States or by QMS certifiers
- repeat of the industry and authorities' survey approaches.

One general conclusion is that it was perhaps quite early to start monitoring the impacts of end-of-waste, because outside Italy the uptake to date has been relatively modest. The rapid uptake in Italy is mostly put down to some specific legal particularities there. However, discussions at the workshop did reveal industry interest from the UK, Netherlands and Spain. One participant thought that it would not be surprising if certification of a QMS and of end-of-waste (from scratch) took at least two years. Neither the results from the surveys nor the feedback from the expert workshop indicate that end-of-waste has so far resulted in any negative impact; whether to quality, availability or the environment. It was therefore considered that there is not any urgent need to revisit monitoring at this stage.

The input gathered at the workshop was used to improve the interim results and was included in this final report.

7.2 Suggestions for future monitoring

7.2.1 On-going monitoring of market trends

One possibility for on-going monitoring is to regularly monitor market trends in the scrap metal industry. This would include reviewing publicly available statistics on scrap generation, consumption, prices and trade to identify whether any market incidents have occurred, with further investigation to see whether any relate to end-of-waste specifically.

The publicly available information of relevance to this study is summarised in Table 29, including remarks on the source organisation, frequency and level of detail which is published. Statistics are available on many key dimensions of the market conditions in the scrap metals industry. However, none of the available data explicitly distinguishes between waste and end-of-waste.

Table 29: Review of data availability for quantitative indicators

Indicator	Unit	Source organisations	Frequency	Geographic detail	Categories/grades
Generation	tonnes	Eurostat waste statistics or calculated from below	Annual	Member State	Total only
Consumption	tonnes	Eurofer, EAA	Quarterly	Member State	Total only
Prices	€/tonne	Eurofer, Metal Bulletin, EAA, LetsRecycle etc.	Monthly	EU, UK, Germany, US etc.	Approximately 15 grades
Trade	tonnes	Comext-Eurostat	Monthly	Member State	Broad categories

Discussions at the expert workshop confirmed that although some data may be available through analysing trade customs statistics, most of the data available through Eurostat makes little distinction between waste and end-of-waste.

Some exceptions to this lack of data disaggregation may be trade statistics to a few non-OECD countries that were formally not allowed to accept imports of waste, but are now able to accept imports of end-of-waste (such as the UAE). Another exception is Spain, where the Spanish scrap industry has made an agreement with the Customs statistics authority to report end-of-waste under a specific trade category, but this practice does not seem to be widespread or harmonised across other European countries.

In addition, none of the participants at the expert workshop felt that there was any urgent need to extend the monitoring exercise into the immediate future. This was because the uptake observed for end-of-waste has so far been relatively modest outside Italy, and because no adverse impacts had been identified which specifically relate to end-of-waste.

7.2.2 Specific monitoring mandates

Another possibility is to give a specific monitoring mandate either to EU Member States or to QMS certifiers. During the workshop discussions, it became clear that relatively few organisations are formally collecting statistics on the uptake and use of end-of-waste criteria.

EU Member States

Both the survey conducted and the remarks at the expert workshop indicated that few Competent Authorities seem to monitor end-of-waste, whether in a general sense or specifically to regularly collect and record compliance certificates.

This is partly because there have been relatively few applications (outside Italy); but also because there is no legal obligation to do so and responsibilities are often spread between a number of different organisations. Some EU Member States do have specific plans for the future monitoring of end-of-waste, but these Member States are relatively few.

QMS certifiers

Since it is mandatory that QMSs must be implemented as part of end-of-waste, monitoring could, in principle, be carried out using QMS certifiers. For example, a QMS according to ISO 9000:2008 has only six mandatory procedures – all other procedures are added by the organisation itself, to suit the QMS to its own organisation. Certification of such a QMS is valid for three years.

A new procedure concerned with monitoring end-of-waste could be added to the requirements for certification. Such a procedure can be published by an organisation such as BIR, which is experienced in providing the industry with tools for quality management, environmental management and occupational health and safety management. When such a procedure is in place, all participants must automatically collect that data as part of their QMS. If desired, this extra procedure can be removed after three years and before re-certification of the organisation.

Therefore it is clear that obtaining data through (ISO and other) certification bodies might be possible, although this would require some rule changes. However, this would add to the administrative burden for companies to obtain a QMS and hence end-of-waste. In addition, there are differences between types of QMS, and ISO certification specifically is not a mandatory part of the end-of-waste criteria.

7.2.3 Repeat of the survey approaches

Given that few Competent Authorities or official data make any distinction between waste and end-of-waste, a survey is considered to be the least intrusive means of collecting the necessary data. This suggestion **was supported by the majority of the participants at the expert workshop**.

The industry associations that have been involved in this study would be able to assist again in developing the survey methodology and distributing it to their members. Some industry associations already seem to have good knowledge of the uptake of end-of-waste within their memberships, and therefore should be engaged early in the process should a future monitoring exercise be conducted. A survey specifically tailored towards industry associations might be useful in addition to that targeted at industry. The industry associations are also in a good position to provide feedback and suggestions for the survey design and wider monitoring methodology.

The specifics of the survey design could be revisited at that point to make sure that it is streamlined and fully covers all the key points required under any future monitoring activity. It is also recommended that the survey is available in several European languages (including English and Italian specifically); available both online and in word/paper format, and that sufficient time is allowed for survey responses, i.e. that the survey is not solely conducted over a holiday period.

In terms of frequency, another survey could be conducted in 2-3 years' time, by which time end-of-waste criteria will have had further time to be implemented for iron, steel, aluminium and copper scrap; and uptake may be more widespread across Europe.

8 Conclusions and recommendations

8.1 Conclusions

8.1.1 Rationale and methodology

This study reviews the uptake and impact of end-of-waste criteria for scrap iron, steel and aluminium which came into force across Europe from October 2011. These criteria specified the recovery operations and quality procedures required to meet the criteria, by which these metal scrap could cease to be regulated as waste.

Data was collected and analysed from industry and from the Member States' Competent Authorities to examine the impacts of Regulation 333/2011 on scrap volumes, availability, trade flows, prices, administrative requirements and any environment or human health incidents. Industry associations provided valuable assistance in disseminating the survey to their members and gathering relevant data.

Approximately 250 company survey responses were received from across Europe (representing approximately one quarter of the membership of the scrap industry associations), as well as 15 industry association submissions and 25 from Competent Authorities. An expert stakeholder workshop was held in Brussels at the end of March 2014, where further industry and Member States feedback was received.

8.1.2 Key findings

Uptake of end-of-waste

The results of the study show that more than 1,100 scrap industry companies are already using the end-of-waste criteria in Europe:

- Uptake is most pronounced in Italy, where over 1,000 scrap companies generate end-of-waste compliant scrap. This rapid uptake in Italy is partly due to a similar pre-existing legal framework on secondary raw materials before the introduction of the new Europe-wide end-of-waste criteria.
- In the rest of Europe (outside of Italy), uptake is relatively modest to date, with only a further 100 scrap companies active in end-of-waste scrap markets. However, discussions at the workshop did reveal significant industry interest from the UK, Netherlands and Spain, in particular.

The study estimates that, as a lower bound, at least 15% of EU scrap steel consumption and 10% of scrap aluminium is end-of-waste compliant. The majority of this compliant scrap is consumed within Italy in steel and aluminium furnaces. However, some significant quantities of compliant scrap appear to be generated in countries other than Italy, which are then exported for consumption in Italy.

Impact of end-of-waste

Importantly, neither the results from the surveys nor the feedback from the expert workshop have indicated that end-of-waste had, so far, caused any negative impacts on the market, whether that is to scrap quality, availability/trade or upon the environment. On the contrary, quite a number of the survey participants have highlighted the benefits of the introduction of end-of-waste for metal scrap.

These benefits include:

1. Creating a simplified regulatory framework with relation to the reduction of the impacts of waste legislation, such as no longer needing to obtain waste permits and licenses.
2. Offering companies greater flexibility and legal certainty, allowing a clear choice between operating under waste legislation or alternatively under the end-of-waste framework.
3. Improving the quality of scrap. This has led to a perceived increase in the prices for scrap of approximately 1% and hence may have enhanced sales revenues for scrap companies.

This is not to say all companies have identified benefits from achieving end-of-waste. Indeed, in Italy, the implementation of end-of-waste has been so widespread that it has simply meant keeping up with the competition and satisfying customers' requirements.

Some companies report that the costs for achieving end-of-waste compliance outweighed the benefits. For example, some commented that the costs associated in certifying new Quality Management System (QMS) or improving the technical recycling process to reduce the contamination levels, were higher than their expected benefits.

One further explanation of the modest uptake of the end-of-waste criteria so far, is due to the length of time it can take to certify a Quality Management System (QMS) and adopt the criteria, which can be at least two years when starting from scratch.

Differing EU implementations

Finally, this study has revealed that the end-of-waste criteria are being used and implemented in different ways in different EU Member States. Some of this might be expected, because of specific differences between individual EU Member States, most notably different legal situations, such as in Italy.

There is widespread support for the continuation of the end-of-waste framework, because of the benefits listed above, with companies particularly appreciating the flexibility of operating under both the waste and end-of-waste regulations, while providing greater legal certainty. However, greater harmonisation of approaches across Europe may be useful in improving the effectiveness of the end-of-waste regulations.

Most notably these blockages include: the role of accreditation bodies in certifying companies to end-of-waste, avoiding the requirement of a specific QMS to be implemented (e.g. ISO 9001), scrutiny of the link between end-of-waste and the loss of recycling subsidies/tax rebates and training for customs services on inspections of cross-border shipments. Many of these barriers are currently on track to being overcome.

In addition, few Competent Authorities' or official data make any distinction between waste and end-of-waste, and where data specifically on end-of-waste is collected there does not seem to be a widespread or common approach across European countries. Moreover, it does not appear that any industrial actor or official body currently plans to set up a structured database to keep track of end-of-waste specific trade flows inside and/or outside the EU.

8.2 Recommendations

A main conclusion of the expert workshop was that it is quite early to start monitoring the impacts of end-of-waste. This is due to the relatively modest rate of uptake outside Italy and the relatively few impacts that have been observed. Therefore, there is no urgent need to revisit monitoring.

Several ideas for a future monitoring system were proposed and debated. However, a repeat of the surveys in 2-3 years times was deemed to be the most appropriate and least intrusive way to monitor the uptake and impact end-of-waste for scrap metal.

By this time, end-of-waste criteria will have had further time to be implemented for iron, steel and aluminium; and copper scrap could be added to the scope of that exercise.

The industry associations would again be able to assist in distributing the survey to their members and collecting the necessary data. The survey design could also be revisited at that point to make sure that it is well streamlined and covers all the required points.

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